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THE GAS JOURNAL

APRIL 15, 1931

A Glance at the Contents—

Education of Gas Salesmen.

We outline the scheme of training for gas salesmen which has been put forward by the B.C.G.A. [p. 147.]

Hinckley Gas-Works Visited.

At the invitation of the Hinckley Urban District Council, members of the Midland Junior Gas Association visited the gas-works on March 21. [p. 170.]

Dundee Gas Managership.

Applications are invited for the appointment of Engineer and Manager to the Dundee Corporation Gas Department. The commencing salary is £825 per annum, rising to £950 by annual increments of £25. A letter of protest against the salary from the Institution of Gas Engineers appears in our Correspondence Columns. The salary the Institution suggest is £1250. [p. 146.]

London Juniors Visit Fulham Works.

Last Saturday afternoon (April 11) the London and Southern District Junior Gas Association, under the presidency of Mr. T. H. Prater, of Margate, paid their last works visit of the present session—the venue on this occasion being the Fulham Gas-Works of the Gas Light and Coke Company. The visitors, numbering about sixty, were welcomed by Mr. A. H. Solomon, the Station Engineer. [p. 169.]

Fredrick Accum.

An account is given of the activities of this early pioneer of gas lighting, who was a member of the original Board of Directors of the Gas Light and Coke Company in 1812. No chemist living appeared to be more comfortably or permanently established than he, and yet it was the misfortune of this unhappy man to witness, within a single month, the loss of reputation, business, and friends, owing to an unsubstantiated charge of theft which was brought against him and was no doubt due to the machinations of interested parties whose nefarious practices he had exposed. [p. 154.]

Galvanized Wrought-Iron Services.

A report of the Spring Meeting of the North British Association of Gas Managers is published. In the course of his Presidential Address, Mr. H. G. Ritchie, of Falkirk, said: "To prevent internal corrosion of service pipes, for the past eight years I have been using wrought-iron tubes galvanized inside and outside. All tubes contracted for are to be to the specification of the Institution of Gas Engineers. Eight years is not a long period of trial, but, on examining some of those longest in use, I feel satisfied that the results will justify the small additional cost for galvanizing." [p. 163.]

Gas Engineer and General Manager Required.

Applications are invited for the position of Gas Engineer and General Manager to the Darwen Corporation Gas Undertaking. The salary offered is £600 per annum, rising to £700. [p. 180.]

Displacement of Electricity by Gas.

An illustrated description is given of an excellent low-pressure gas lighting installation at a garage in North London, where formerly electricity was employed. The work was carried out by the Tottenham and District Gas Company. [p. 156.]

B.C.G.A. Scottish Conference.

This Conference will be held in the Technical College, Galashiels, on Thursday, April 30, under the Presidency of Mr. James Dorward (Chairman of the Galashiels Gas Light Company). We publish the programme which has been arranged. [p. 151.]

Street Lighting and Safety.

More than two hundred borough and district councils have now appointed public lighting engineers or lighting superintendents to give expert advice as to the system of street lighting which may provide the greatest degree of safety for both motorists and pedestrians in their areas. [p. 152.]

New Showrooms at Cork.

A striking and very attractive addition to Cork's modern and up-to-date buildings has recently been completed, and the unremitting care and thought taken at every stage of its design, erection, and furnishing have resulted in premises admirably suited to the purpose for which they are intended. The building referred to is the handsome new suite of showrooms which the Cork Gas Consumers' Company have constructed at an important corner, No. 1, Patrick Street—the city's principal shopping thoroughfare. [p. 151.]

"Daily Mail" Ideal Home Exhibition.

In this exhibition the most up-to-date and attractive home ideas are represented in nearly 600 exhibits, which comprise furnishing and music, decoration and sanitation, heating and lighting, refrigeration, housing, building, and other sundries, domestic appliances, food and cookery, &c. In such an exhibition, gas rightly plays an imposing part. The Committee entrusted with the combined exhibit of the seven London Gas Companies have once more taken a broad view of their responsibilities, and have staged a display well worthy of the great industry to which they belong. [p. 157.]

EDITORIAL NOTES

A Great Opportunity

THE British Commercial Gas Association Scheme for the Education and Training of Salesmen has now been issued, together with a sample of the handbooks that form an important part of the Home-Study *plus* Group-Discussion Course in Domestic Gas Salesmanship, and we should like to congratulate first of all the Association on the splendid service they are rendering to the Industry by its production; next, the sales men and women on the opportunity thus afforded them of increasing their efficiency and thereby their value, and also on the increased interest their work will possess after they have taken the course; and last, but by no means least, every undertaking in the Industry upon the promise which the scheme holds for increased business and more strongly entrenched present business for each undertaking that seizes this means and makes the utmost of it for raising the selling power of its staff. The Gas Industry wants more business; it wants more security for its business. We are convinced that the scheme now put before it—which is explained on later pages—will ensure both for every undertaking that invests in it.

Recently we were given the opportunity of going through in detail the report which Mr. Harold Whitehead has made to the B.C.G.A. on the research which, with the assistance of a large number of salesmen and executives all over the country, he has made into the selling problems of the Industry and the best methods at present employed in dealing with them, together with suggestions for developing these methods in certain directions. That report, and the discussions with a special Committee of experts upon it, have formed the basis of the Domestic Gas Salesmanship Course to which we have referred; and we can say, knowing we shall have the fullest concurrence of each member of the Committee in doing so, that the report is most thorough, interesting, and full of valuable suggestion, and that we feel thoroughly satisfied that a course built up on that foundation must prove of great practical value to every student of it and of great financial value to the undertaking by which he or she is employed.

There are hundreds of salesmen, and would-be salesmen, in the Industry who have worked hard and zealously to acquire the technical knowledge which is essential to the commercial-technical representative of a gas undertaking, and who are anxious to be taught how to apply that knowledge to the practical business which is the ultimate aim of their activities—namely, increasing the sale of gas in their districts. They realize that it is no use being full of knowledge if you cannot apply it to the business of selling—that, indeed, unless you know how and when to use it or not to use it, technical knowledge is of little value and may even be a hindrance. For such, the new scheme will be invaluable, the very thing they are seeking, and many of them have been asking for. To those, anxious to become competent salesmen, who have neither adequate technical knowledge nor training in the art of selling, the complementary course in the groundwork of the technical knowledge essential to the gas salesman which the B.C.G.A. scheme provides, in addition to the course in Domestic Gas Salesmanship, will prove invaluable. That simplified technical course is now in preparation, and will be ready very shortly.

And it is none too soon that these fresh and important steps are being taken for raising the standard of selling efficiency throughout the Industry. No reader of ours needs to be told that competition in the gas field becomes more acute every year. No one who watches the signs of the times can have any doubt that it is going to be increasingly intense during the near future. Ministers of the Crown have been on the stump for electricity. All political parties are trying to make capital out of its advocacy. The Gas Industry is still hampered by obsolete statutory restrictions.

We know that the National Organizations of the Industry are fighting against these injustices, and doing their best to help us all to overcome our handicaps. But the most important thing of all is for every individual undertaking in the Industry, and every individual employed in every undertaking, to be up and doing—doing each and every one everything possible to fight competition with the weapon of efficient service as well as competent and adequate publicity. Efficient service demands efficient personnel in growing numbers—and that implies efficient education and training. For that, opportunities are now provided which we hope and believe will be seized with avidity by students all over the country, and welcomed by every gas administrator who realizes the urgent needs of the situation. Never has a better opportunity for wise investment been afforded than in the Domestic Gas Salesmanship Course. We hope to hear of hundreds of undertakings enrolling all their salesmen and paying their fees.

Service in the Home

IT would doubtless be correct to say that the fifteenth "Daily Mail" Ideal Home Exhibition now being held at Olympia is the best of the series—good as its predecessors have been. Ten acres of floor space is not a foot too much to display all that is newest and best in modern home ideas, and the serious visitor will take away with him, or her, many ideas for increasing the comfort, the beauty, and the efficiency of the modern home. "Be it ever so humble, there's no place like home," remains as true now as ever it was. We are all home lovers, and therefore an Ideal Home Exhibition makes universal appeal. One feels, in contemplating such an Exhibition, what a calamity it would be were gas inadequately represented thereat, what an opportunity would be lost, and how incomplete would be any picture of the ideal home without the inclusion of one of its greatest features! Let it be said at once, therefore, that gas occupies at Olympia the place that it should do.

We should be failing in our duty did we not acknowledge here the debt which the Industry owes to the seven great Gas Companies of the Metropolis and to the various apparatus manufacturers, &c., represented at the Exhibition. This is really work for the general good; there must be benefit to the Industry, as well as to the individual. During the run of the Exhibition, which continues until May 2, people from all over the country will be inspecting Olympia, and many will be taking away with them increased knowledge as the result of their visit. Knowledge of improved uses of gas in the home, and knowledge of additional uses. The London Gas Exhibit, the "Sunlit" House equipped by the South Metropolitan Gas Company, and the stands of the different manufacturers demonstrate all that is best and latest in domestic applications of gas. Exactly what all the best and latest embraces we do our best to describe by pen and picture on later pages. Whether one's main quest for the home be beauty, efficiency, or saving of labour, the Gas Industry can meet the need. That the position which gas holds for cooking and heating it is fitted also to occupy in regard to lighting is demonstrated at Olympia.

Falkirk's Gas Supply

DURING the time Mr. H. G. Ritchie has been at Falkirk—he was appointed Engineer and Manager to the Corporation Gas Department in 1920—the consumption of gas in his area of supply has grown in a manner which reflects great credit on his administration. Part of the story of how he has achieved such good results is told in his address as President of the North British Association of Gas Managers, which is published in our issue to-day, and which is a brief survey of Falkirk's practice of gas manufacture, distribution, and sales during the past ten years. Regarding the first phase of the Department's work, Mr. Ritchie explains the type of carbonizing plant—Glover-West verticals installed in 1920-21—and how it has stood up to wear and tear. The record is a good one, and the virtues of silica brick construction are well demonstrated. At the same time Mr. Ritchie is not happy about the type of jointing material employed with silica retorts, and he contends that further research is necessary. It is only at the joints that he has experienced leakage, and this leakage manifests itself strongly after scurfing. "In one retort," he says, "we patched by means of the cement gun in 63 places. Some joints had opened up so much that it was found advantageous to mix pieces of broken silica with the cement." It is obvious that blasts of air through the retorts at Falkirk are having an unwonted deleterious effect during the scurfing period. The nature of the scurf, too, may have an adverse influence. As was pointed out at the meeting of the Institution of Gas Engineers last November, experience with different retorts carbonizing different coals suggests strongly that the nature of the scurf varies considerably with the coal used and the carbonizing conditions. The tenacity with which scurf is held to the surface varies very much in different settings. However, the main trouble at Falkirk—and one of which Mr. Ritchie is aware—is the high temperature at which the retorts are put on to the scurfing operation. Mr. Ritchie gives the working results of the last completed year—84·05 therms per ton of coal; gas of 431 B.Th.U. per c.ft.; 20 gallons of tar; and just over 6 cwt. of coke for sale. Regarding the last figure, a large amount of coke must be used for steam raising in the works. Falkirk would seem to offer a sound opportunity for the installation of a waste-heat boiler.

Turning to the distribution side, Mr. Ritchie mentions that for the past eight years he has been using for service pipes wrought-iron tubes galvanized inside and outside. Though eight years is not a long period of trial, he feels satisfied that the results will justify the small additional cost for galvanizing. All meter repair work is carried out by the Department, and Mr. Ritchie is of opinion that it would pay any gas undertaking to employ a meter repairer, provided there was sufficient work for the latter to be constantly employed. Particularly interesting are the author's remarks about his sales policy and organization. He has in operation a survey of consumers' appliances, which is undoubtedly fostering goodwill; he supports national advertising and does as much local advertising and general propaganda work as possible, though he considers the Department's showroom the best form of advertisement they have; and he is "all-out" to offer thoroughly good service to prepayment consumers. Free loan cookers were offered by the Falkirk Gas Department as long ago as 1911, though, in general, Mr. Ritchie considers that free-loan cookers are not invariably remunerative, and that only a reform in the methods of charging for gas will counteract the effect of the consumer who has a free cooker but uses it insufficiently to render the loan a business proposition. High-grade cookers are sold on a five-years' hire purchase basis, while certain types of mottled-enamelled cookers are offered at simple hire rates—which rates vary according to the use which the consumer makes of his appliance. The result of all these efforts is shown by the fact that prepayment consumers account for 61 p.ct. of the sales of gas, compared with 23 p.ct. used by ordinary consumers. Moreover, the average consumption of the prepayment user is in excess of that of the ordinary user.

On Tar and Coke

A CONSIDERABLE portion of the address is devoted to a review of the position and future prospects of bye-products; and we cannot help thinking that Mr. Ritchie is inclined to be pessimistic about the markets for tar in the future. We believe, for example, that the efforts of the British Road Tar Association will bear great fruit shortly; certainly the current investigations on the production and handling of tar for road purposes are pregnant of success. Co-operation at present is greater than ever before, and it is bound to yield good results, for a uniform supply of properly prepared British tar is a thoroughly satisfactory product. Also, the full possibilities of coal tar are yet to be discovered. Only in last week's "JOURNAL" we referred to an editorial note in the "Journal of the Society of Chemical Industry," and quoted the following: "The trials and experiences of the last few years have proved that one thorough spraying of tar oil at the proper time in January during the dormant stage of the tree entirely kills the eggs of most of the insect pests and cleans the tree of mosses and lichens. These tar oils are special fractions, carefully studied by the tar distiller; they are sent out emulsified, so that they mix with water to a milky white liquid." This is only one minor example of the recent uses of tar; and many more will be found and developed.

On the subject of coke, Mr. Ritchie says: "Coke produced at coke ovens is entering more than formerly into competition with that produced at gas-works, but fortunately most of our customers find it unsuitable. . . . Low-temperature fuels do not make much progress." Now our belief is that there are cokes and cokes, and that a particular coke is suitable for a particular purpose (or purposes). And in this respect the Gas Industry has before it a splendid opportunity for the sale of high-temperature gas-works coke for the open firegrate, as well as for the domestic hot water boiler. In support of our contention that properly prepared and marketed gas-works coke is pre-eminently suitable for the domestic firegrate, we cite a few of the remarks made by Mr. H. J. Hodsman, of Leeds University, in a recent valuable review of the progress of coking technology. He referred particularly to the burning of different kinds of coke in the open fire-grate—a subject to which he and his collaborators at Leeds University have devoted a great deal of attention during the past few years. He said that if a coke is to be burnt in open fires the first essential is to maintain a high temperature in the fuel bed. If the temperature falls there is more danger of extinction than with coal, and oven cokes are in the most precarious position. As they require the highest temperature to ignite, so also will they extinguish at the highest temperatures. Their high density is also disadvantageous, causing a more rapid loss of heat by conduction.

As far as radiation is concerned, Mr. Hodsman observed that it is advantageous if the fuel has a low bulk density and irregular geometrical shape, so that close packing does not occur. Examples of this are some low-temperature cokes, vertical retort gas cokes, and cokes carbonized in small charges free to swell. On the other hand, where the fuel is of rounded regular shape, and so packs closely, is close grained and dense, with a high bulk density, then the radiant efficiency may be expected to be correspondingly lowered. Those conditions are found in fuels carbonized under pressure, as in intermittent chambers, coke ovens, and in briquetted fuels. Such fuels usually have the compensating advantages of high mechanical strength and adaptability for transport and storage, while a greater weight of fuel can be charged into the fire at once—all advantages where the fuel is to be used in closed appliances, but so far as the open fire is concerned they can be had only at the cost of heating efficiency. Volatile matter is not a great asset in regard to the output of heat. Some of it will escape unburnt and so make no useful contribution; if ignition occurs, owing to the low emissive power of flames, it contributes little radiation when burning above the fire. This applies particularly to low-temperature coke where the flame is non-luminous. For that reason, high-tempera-

ture cokes are more efficient as heating agents than low-temperature cokes or coal.

The foregoing is set out not to belittle the virtues of coke-oven coke, but to point out that gas undertakings are in a peculiarly fortunate position in being able to produce a solid smokeless fuel specially adapted for domestic consumption; and as educational propaganda on the evils of smoke and on the facility with which these evils may be eliminated is extended and further appreciated—as it is bound to be—the market for coke will necessarily be enhanced. There is no excuse for despair or for apathy, and there is no reason to suggest that greater co-operation between the Coke Oven Industry and the Gas Industry is impossible. In these columns a few weeks ago we called attention to the recently expressed views of Dr. C. H. Lander. Bearing in mind the enormous consumption of raw coal, he believes that it would be a good plan if there was more direct co-operation between the gas and the coke oven industries—co-operation which would not limit, but would increase far beyond the present limit, the amount of coke made and rendered available for the domestic consumer. " A really active and intelligently conducted sales policy to induce the householder to substitute coke of some type or other for raw coal would soon lead to a demand far greater than the supply, and so stimulate the manufacture of both gas and oven coke."

A *Paramount Duty*

One of the matters referred to by Sir Arthur Duckham in the course of his remarks at the North British Association luncheon last week should be emphasized here. Though it has been stressed in the " Journal " times without number, it must be energetically kept in the forefront so long as any vestige of reason for complaint remains. While the technical side of the Industry is striving by every means in its power to increase its efficiency and to raise its status, it is a paramount duty of gas administrators to perform their part by making attractive the positions they have to offer.

As Sir Arthur said, it is essential to encourage the best brains to come into the industry, and this can only be done by offering the inducement of adequate remuneration. An industry which is responsible for vital services to the community, and in which some £200,000,000 of capital is at stake, with a future before it holding out promise beyond anything it has experienced in the past, involves great responsibility for those on whom its progress—nay, its very life—depends; and this responsibility must be suitably recognized. In this as in other cases, encouragement is the better course to pursue; there are still some gas undertakings which seem more inclined to follow the course of discouragement.

Bearing upon Sir Arthur's remarks, it will be seen from our Correspondence columns to-day that the Institution of Gas Engineers have been consulted as to the advertisement by the Dundee Corporation for a Gas Engineer and Manager at a commencing salary which the Executive Committee of the Council of the Institution regard as wholly inadequate for one who is to have entire charge of an undertaking of that size. How regrettable it is that such a protest should be necessary !

The Industry's Finances

On more than one occasion during recent months, when so many investments have been involving their holders in heavy losses, we have drawn attention to the remarkably satisfactory record of gas securities in this connection. Many people who have indulged in more spectacular flights must be wishing that they had possessed sufficient foresight to confine themselves to steady-going gas. Gas may have no inducements to offer to the " get-rich-quick " brigade, but then neither does it bring to its devotees any risk that they may " get-poor-quick." Since the breaking of the wave of speculation which had carried the prices of so many stocks and shares to extraordinary heights, equally numerous securities have fallen to equally extraordinary depths. But gas companies have gone quietly on their way, without causing any proprietor a sleepless night.

Investors might do a great deal worse than cast their eyes upon the Gas Industry. By supporting it they can serve themselves and serve the community, to whom gas is of inestimable value. That the Industry does offer solid advantages to the investor is widely realized, as is evidenced by the excellent response made to the comparatively large number of invitations to subscribe to the capital needs of gas undertakings that have appeared in our advertisement pages during the last little while. The gas investor is one who acts upon the excellent principle that " it is better to be safe than sorry."

Our thoughts are turned once again to the question of the Gas Industry from the investment point of view by the appearance of that part of the Gas Undertakings Returns for the year 1929, which deals with finance and prices. This has just been published by H.M. Stationery Office, Adastral House, Kingsway, London, W.C. 2, at the price of 10s. 6d. net. All authorized gas undertakings in Great Britain are included; the number being 771. Of these, 451 are in the hands of companies, while 320 belong to local authorities. At the end of the year named, the total paid up share and stock capital of the companies was close upon £88,000,000; and the issued loan capital was £29,250,000. This shows a total amount involved of £117,000,000. The total amount of money borrowed by local authorities (of which over £40,000,000 has been repaid or is in sinking funds) is nearly £72,000,000; so that we have a total capital expenditure represented in the Gas Industry of some £190,000,000. Apart from the essential nature of its services to the public, this is an industry of sufficient magnitude to call for considerate treatment at the hands of politicians, and to insist that its voice be heard when it has reasonable grounds for complaint.

It is seen from the Return that the profits of the companies for the year reviewed come out at just over £7,000,000, while those for the local authorities figure at a few pounds less than £800,000. The dates of Special Acts and Orders are included, and also the maximum or standard prices of gas, the prices actually charged, and particulars of meter rents.

A Guide to Gas Fitting.

The interest displayed month by month in Mr. R. N. Le Fevre's articles in the " Gas Salesman " on " Modern Gas Fitting " clearly indicates that they are proving a great help to the student of the subject and a practical guide to the fitter. Nos. 1 to 10 of these articles are now available reprinted as a booklet, exhaustively covering the subjects of Meter Fixing and Pipe Threads. With its many diagrams, it forms a valuable pocket guide in handy size with stiff paper cover. It is intended to reprint subsequent articles in the same style. Particulars as to prices will be found elsewhere in this issue.

The Budget.

The Chancellor of the Exchequer has intimated that he proposes to introduce the Budget Statement on the 27th of this month; coincident with this announcement the too-familiar buff Income-Tax Returns are rapidly making their appearance, and form a general topic of conversation. Each year the subject of taxation becomes more involved, and while the ordinary taxpayer is again compelled to ponder deeply on the question, those of our readers whose duties entail the additional difficulties of completing these forms on behalf of their undertakings will be interested to learn that many gas-works secretaries and other officials have testified to the undoubted assistance and guidance received from the book by Mr. H. T. Seymour which was published last year at the " Journal " Offices, and which, in the opinion of many, will long remain the standard work on the " Assessment of Gas Undertakings for Imperial and Local Taxation."

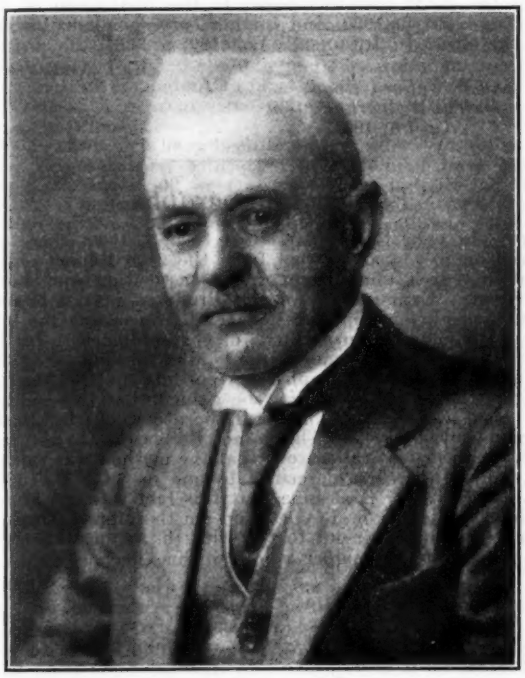
PERSONAL

H. N. BARROW.

Few men are better known in the wrought-iron tube trade in the North than Mr. H. N. BARROW, J.P. Mr. Barrow has been connected with Messrs. John Russell & Co., Ltd., of Walsall, and Messrs. James Russell & Sons, Ltd., of Wednesbury, for over 51 years, and for a considerable number of years he has been the local Manager of the latter firm in Manchester.

Both these Companies have recently been taken over by Messrs. Stewarts & Lloyds, Ltd., of Birmingham, who have closed down the Manchester Branch; but Mr. Barrow will remain for a few years as a link between them and his old firm.

Mr. Barrow was appointed a Justice of the Peace for the City of Manchester in 1910, and he has been the Chairman of the Justices' Gas Meter Testing Committee for the past ten years, during which time he has been in close touch



with the chairmen and engineers of gas undertakings in many parts of the country, as well as with large engineering undertakings generally. He is President of the Association of Statutory Gas Meter Inspectors of Great Britain, and for seven years has presided at their meetings. In 1920 Mr. Barrow represented the Administrating Authorities of Great Britain at the Board of Trade, in amending the Sale of Gas Act, 1859. He is looked upon, from the administrative side, as an authority on the subject, and he is still carrying on this useful work.

We are sure that the good wishes of his many friends will follow Mr. Barrow in his future sphere of activity.

Mr. A. H. SMITH, Gas Engineer to the Darwen Corporation for the last 36 years, has resigned his position. Mr. Smith's managership is a record for any Darwen Corporation official. The resignation was received and accepted by the Gas Committee, and it was decided to advertise for a successor. This advertisement appears in this issue of the "JOURNAL." Mr. Smith's son, Mr. Norman Smith, holds the position of Assistant Engineer at the Darwen Works.

On April 2, Mr. S. J. STONHAM, the Secretary of the Deal Gas-Works Sports Club, was presented with a handsome silver half-hunter watch on leaving to take up a new appointment at Ashford. Mr. J. F. Tyndall, Manager of the Works, in making the presentation, eulogized Mr. Stonham's able services to the Sports Club, and wished him every success in the future.

At a Meeting of the Directors of the Bournemouth Gas and Water Company held on April 10, Mr. WILLIAM CASH, Junr., M.A., F.C.A., was appointed Secretary of the Company, in succession to Mr. H. A. Plumb, deceased, from April, 1931.

Mr. JAMES SELLARS, a member of the staff of the Glasgow Corporation Lighting Department, has been appointed Inspector of Lighting for the City of Nottingham, and takes up duty there on May 1.

Mr. H. D. GREENWOOD, M.Sc., A.I.C. (South Metropolitan Gas Company), and Mr. T. H. PRATER (Isle of Thanet Gas Company) have been elected to Associate Membership of the Institution of Chemical Engineers.

Mr. E. CROWTHER, Deputy Engineer to the Bradford Corporation Gas Department, has been appointed to the post of Chief Engineer.

The Rotherham Corporation have appointed Mr. JOHN T. HAYNES, Assistant Gas Engineer to the Bolton Gas Department, as Gas Engineer and General Manager at a salary of £700 per annum.

OBITUARY

CHARLES ERNEST MURRAY.

The death has occurred of Mr. Charles Ernest Murray, at his residence, 81, Farquhar Road, Edgbaston, Birmingham. Mr. Murray was a prominent figure in the coal trade and Gas Industry, and one of the best-known men on the Birmingham and London Coal Exchanges.

Sixty-one years of age, Mr. Murray was a native of Birmingham, and had been engaged in the coal trade for the whole of his business life. He was associated with the firm of Wilson Carter & Pearson, Ltd., Coal and Coke Factors and Merchants, for forty-seven years, and had been a Director of that Company for nearly thirty years. He was also a Director of the Redditch Gas Company and the Llandrindod Wells Gas Company; a member of the London Committee of the Rail-Borne Coal Factors' Association; and a Vice-President of the Birmingham Branch of the Coal Trade Benevolent Association. Among his other activities deceased was associated with the Wesleyan and General Assurance Society, of which he became Chairman about twelve months ago. He was also Treasurer to the Birmingham and Midland Eye Hospital.

There was a representative gathering at the memorial service held at St. John's Church, Ladywood, Birmingham, on Tuesday, April 7. Among those present were: Mr. R. C. Pearson, Mr. A. Watson, and Mr. F. H. Tipler, Directors of the firm of Wilson Carter & Pearson, Ltd., and the following members of the staff: Messrs. J. R. Pearson, E. Butler, L. P. Wallen, H. J. Clark, H. H. Holland, E. J. Hurd, W. K. Harding, W. J. Hunter, H. Saxton, D. Ingram, and C. E. Hall.

Messrs. A. W. Smith (General Manager and Secretary to the Birmingham Gas Department); Hubert Pooley (Engineer and Manager to the Leicester Gas Department); A. E. Porter (representing Mr. J. Ferguson Bell, of the Derby Gas Company); Major Lamonby and Mr. I. H. Saxton (Directors) and Mr. T. Hufton (Commercial Manager) of the Grassmoor Company, Ltd.; Messrs. A. Millhouse (Commercial Manager to the Pinxton Collieries, Ltd.); Silkstone (Blackwell Colliery Company, Ltd.); Leslie E. Clift (Chairman) and Chas. R. Hackett (Director) of the Redditch Gas Company; Arthur Roberts (Engineer to the Hereford Gas Department); L. E. Twycross (Engineer to the Cheltenham Gas Company); Clifford Holmes Hunt (Director, Llandrindod Wells Gas Company); W. T. Tew (Assistant Engineer to the Gloucester Gas Company); A. W. E. Bullmore (Engineer, First Garden City, Ltd.); W. H. Thomas (Engineer and Manager to the Alcester Gas Light, Coal, and Coke Company, Ltd.); Fred Hawkins (Director, Cannock Old Coppice Colliery); H. G. Wood (Griff Colliery Company, Ltd.); R. H. Burrow (Messrs. Spencer, Abbott, & Co., Ltd.); George Clifford (Messrs. Pratt & Haynes, Ltd.).

The death occurred on April 1 of Mr. HERBERT WILLIAM ROBINSON, of Mawley Hall, Cleobury Mortimer, who was Chairman of the Midland Tar Distilleries, of Robinson Bros., Ltd., and of Synthite Ltd., of West Bromwich and Birmingham, and a Director of a number of other companies. He was recognized as a Midland pioneer of tar for road purposes, and he devoted himself to progressive research to remedy the dust nuisance and to prolong the durability of roads. The funeral took place on April 6 at the Roman Catholic Chapel of Mawley Hall and was largely attended by representatives of the gas and tar undertakings of the Midlands.

Mr. JAMES RILEY, Secretary to the Rossendale Union Gas Company, died on Thursday of last week, in his 86th year. He was appointed Manager and Secretary of the Company in 1878, after serving for six years as Gas Manager and Town Clerk at Brighouse. He resigned from the post of Manager six years ago, but retained the secretarial office. A grandson, Mr. James Riley, is the present Manager of the Company. Deceased leaves one son, Mr. A. H. Riley, who is Chief of the Gas Company's office staff.

CORRESPONDENCE

Naphthalene and Dried Gas

SIR,—In the "JOURNAL" dated March 25 there is published an extract from a thesis by Mr. R. L. Greaves, in which it is stated that dehydrated gas has a higher carrying power for naphthalene than has wet gas. This statement as it stands is misleading. It has often been made, and I am unable to find any authority for it. Experiments show that when naphthalene is deposited by cooling either wet or dry gas the concentration retained by the gas at a given temperature is independent of the humidity of the gas and is the same as was found to evaporate into dry air by Dr. J. S. G. Thomas. While it may be deduced from the well-known work of Dr. Thomas that dehydrated gas will more easily cause the evaporation of an old naphthalene deposit than will wet gas, it does not follow that on reaching a zone of lower temperature the dehydrated gas will be less liable to give a solid deposit of naphthalene.

H. HOLLINGS.

Engineer's Department,
Gas Light and Coke Company,
Horseferry Road, Westminster, S.W. 1,
April 13, 1931.

Salary of the Dundee Gas Engineer

SIR,—The Institution of Gas Engineers has been consulted as to the advertisement of the Dundee Corporation for a Gas Engineer and Manager at a commencing salary of £825 per annum.

I am instructed by the Executive Committee of the Council to say that they regard such remuneration as wholly inadequate for one who is to have the entire responsibility of an undertaking which made 1842 million c.ft. of gas last year.

The best interests of the Dundee Gas Department can only be served by the payment of the proper commencing salary, which—in the considered view of the Executive Committee, based upon its experience and the information and statistics concerning the Industry possessed by the Institution—should not be less than £1250 per annum.

J. R. W. ALEXANDER,
Secretary.

Institution of Gas Engineers,
28, Grosvenor Gardens,
Westminster, S.W. 1,
April 14, 1931.

Glycerin for Gas Dehydration

SIR,—In reply to the letter published in the "JOURNAL" last week referring to my paper and the question of glycerin and gas dehydration, I wish to cite references which will be of value to those wishing to form a satisfactory conclusion to the discussion which has been centred round this subject:

(1) Mr. Harris' paper in November, 1927, and the correspondence in the "GAS JOURNAL" resulting therefrom ["JOURNAL," Vol. 180, pp. 529, 693, 758].

(2) Mr. C. Cooper's paper to the Fuel Conference in 1928 ["JOURNAL," Vol. 183, p. 671].

(3) Dr. E. W. Smith's paper to the Institution of Gas Engineers in 1930, and further correspondence arising therefrom ["JOURNAL," Vol. 190, p. 738].

R. L. GREAVES.

"Rhu," Stafford Road,
Oxley, Wolverhampton,
April 8, 1931.

"Flame Photographs"

SIR,—In your "JOURNAL" for Dec. 3, 1930, there appeared on p. 714 an extract from the 25th Report of the Joint Research Committee of the Institution and Leeds University, Examination of the Products of Combustion from Typical Gas Appliances, Part V., concerning the testing of the combustion products of gas appliances. In this there is mentioned, among others, the method of taking so-called flame photographs. According to the reading matter, the impression might be gained that this method had been worked out in the Laboratory of the Berlin Municipal Gas-Works. This is not the case. On the contrary, it was in my laboratory that the method was worked out, and it was first described by me in "GWF," 1925, Vol. 48, Nov. 28. I assume that this fact was not known to the compiler of the Report, and am therefore taking the liberty of pointing it out to you with the request that you will publish in your paper a note to this effect.

E. FREI.

Hamburg 22,
Osterbeckstrasse 84,
April 1, 1931.

[The above is a translation of the communication from Herrn. Dipl. Ing. Frei.—ED. "G. J."]

FORTHCOMING ENGAGEMENTS

April 16.—INSTITUTION OF GAS ENGINEERS.—Meeting of Refractory Materials Joint Sub-Committee, 2.30 p.m., Stoke-on-Trent.

April 16.—MIDLAND JUNIOR GAS ASSOCIATION.—Meeting in Council House, Birmingham. Mr. H. G. Broadbridge, of Leamington, "Working of Glover-West Retorts."

April 16.—SOCIETY OF BRITISH GAS INDUSTRIES.—Council Meeting in the afternoon.

April 18.—MIDLAND JUNIOR GAS ASSOCIATION.—Visit to Wolverhampton Gas-Works and to the works of the Electric Construction Co., Ltd., Bushby.

April 18.—YORKSHIRE JUNIOR GAS ASSOCIATION.—Meeting at Halifax. Mr. A. Wylie, of Sheffield, on "The Fitting Department," followed by visit to the Halifax Gas-Works.

April 22.—B.C.G.A.—Meeting of Education for Gas Salesmen Committee, 28, Grosvenor Gardens, S.W. 1.

April 24.—B.C.G.A.—Annual meeting of Gas Salesmen's Circles ("Gas Salesmen's Day"), in London.

April 24.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Meeting at the Westminster Technical Institute. Mr. J. G. Clark on "Gas Lighting."

April 30.—B.C.G.A.—Scottish District Conference at Galashiels.

May 1.—LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.—Annual Meeting at the Westminster Technical Institute.

May 1.—NORTH OF ENGLAND GAS MANAGERS' ASSOCIATION.—Meeting in Newcastle.

May 7.—B.C.G.A. Midlands District Conference at Shrewsbury.

May 14 and 15.—EASTERN COUNTIES GAS MANAGERS' ASSOCIATION.—Spring Meeting at Wisbech.

May 15.—SOUTHERN ASSOCIATION.—Visit to the works of the Tottenham and District Gas Company.

May 19.—SOCIETY OF BRITISH GAS INDUSTRIES.—Annual General Meeting in London, under the Presidency of the Right Hon. Lord Eustace Percy, M.P.

May 20.—BRITISH COMMERCIAL GAS ASSOCIATION.—Meeting of General Committee, 2.30 p.m.

May 21.—MIDLAND ASSOCIATION.—Meeting at Wellington, Salop.

May 21.—WALES AND MONMOUTHSHIRE DISTRICT INSTITUTION OF GAS ENGINEERS AND MANAGERS.—Meeting at Cardiff.

June 2-4.—INSTITUTION OF GAS ENGINEERS.—London Conference.

June 30.—NATIONAL GAS COUNCIL.—Thirteenth Annual General Meeting.

Sept. 28-30.—BRITISH COMMERCIAL GAS ASSOCIATION.—Annual Conference at Exeter.

Oct. 27-28.—INSTITUTION OF GAS ENGINEERS.—Autumnal Research Meeting.

Education and Training of Gas Salesmen

The B.C.G.A. Scheme in Brief

That there is need for a sound practical scheme for the education and training of those engaged upon the Sales and Service side of the gas industry requires little argument to-day. It is being asked for in all directions, not only by managers who appreciate the pressing need but—and especially—by the salesmen themselves.

The steady increase in the intensity of competition in these days, alike with electricity and with oil; the complete disappearance of the times, which will never return, when an increase in the sale of gas could be relied upon without any serious effort being made to secure it; the obvious need of skilled planning, direction, and execution of continuous selling campaigns and maintenance schemes, necessitate beyond any question the employment by every gas undertaking of staff competent to meet that competition and to carry out such a progressive policy in the most efficient manner possible.

The means which have been under consideration for providing this necessary education and training have been publicly discussed on several occasions—notably at the B.C.G.A. Conference at Bridlington last autumn [see "JOURNAL," Nov. 5]. Consequently, the complete Scheme which has now emerged requires no introduction to the industry, and a full summary of its provisions is available in a brochure issued by the B.C.G.A., under whose auspices, of course, it is being launched.

The Scheme takes for granted that the matter of general education is one for the individual himself—with any guidance and help he may obtain from his employer or educational adviser. From this standpoint, it provides the gas salesman with the means of acquiring (*a*) the necessary degree of technical knowledge for his job; (*b*) the necessary amount of knowledge of the economics of the industry; (*c*) a specialized knowledge not only of how to sell, but of *how to sell gas, gas appliances, and gas service.*

Technical Knowledge.

Many of those engaged in the commercial service of the industry have already acquired some, not a few a sufficient, degree of the technical knowledge necessary for gas salesmanship, either through technical institutions or by private study, and have given proof of possessing that knowledge by obtaining certificates from the Institution of Gas Engineers or City and Guilds of London Institute. The ideal of sound technical knowledge, it is considered, is that which a student would acquire by taking the Gas Supply Course of the Institution of Gas Engineers (with its basis of ancillary subjects necessary to the full understanding of the main subject) right through the Ordinary and Higher Grades to the Diploma. For many, especially of the older students and of those to whom the Gas Supply Course, even up to the Ordinary Grade Certificate only, presents too many difficulties—though all who can are *most strongly advised* to take the Gas Supply Course, both for its value and for its interest—a less difficult course has been prepared which will be known as the Gas Sales Technology Course. This Course, for which only those engaged in the gas industry will be eligible, will cover two seasons, and will shortly be available at those Technical Colleges where gas subjects are taught. It will also be available by correspondence covering such period as the student may find necessary and convenient. The syllabus for this Course, which is given in an appendix to the brochure, covers Gas Manufacture and Distribution; Solid Fuels; Liquid Fuels; Heating and Ventilation; Flames; Lighting Appliances; Electricity Supply; Gas for Heating and Cooking; Water Heating; Gas Prices; Sale or Hire of Gas Appliances; Competition (with other fuels); and certain requirements in elementary Physics and Chemistry.

Economics of Gas Supply.

For all salesmen students, instruction (either elementary or advanced) in the economics of the industry and its history as a Public Utility is considered essential. This will be covered in elementary form in the Gas Sales Technology Course (described above); but it will also be provided under the Scheme in more advanced form as a separate subject to constitute a supplementary study, available only to those engaged in the gas industry, for those who take the Gas Supply or Gas Supply Practice Courses of the Institution. This should, moreover, as soon as facilities are available, be taken as a separate complementary subject by all students who have completed their course in Gas Supply.

The syllabus in the Economics of Gas Supply, which is detailed in the appendix, covers the history of the industry; the statutes governing its operations, and especially its relations with consumers, including powers and methods of charge; and the relation of the industry to Smoke Abatement, Public Health, Coal Conservation, and other national problems. It also deals with the history of the gas industry as a Public Utility.

Facilities for this supplementary subject, which may be dealt with in one session, are to be arranged as soon as possible either at recognized educational institutions throughout the country, or on the premises of the gas undertakings themselves, with or without the co-operation of the Local Education Authority; or by correspondence for students in outlying areas or for those who through the exigencies of seasonal work find it difficult or impossible to attend classes or lectures.

Science and Art of Selling.

The third provision of the Scheme is the Domestic Gas Salesmanship Course. Although the Technical and Economic Courses described above are regarded as the first step in the normal procedure of training, and are indeed necessary to the system of certification which has been drawn up, the Salesmanship Course is the most novel and *the most urgently needed* branch of the Scheme. It is now ready to be put into immediate operation, and the Executive hope that all undertakings will give this new step towards selling efficiency their full support. They believe that expenditure upon it will be quickly repaid many fold to every undertaking assisting its staff to go through the Course, which, they would emphasize, has been prepared with the thorough assistance of some of the leading Salesmen in the industry—including much personal advice, in principle and in detail, from the Chairman of the Executive.

It may be as well here to recapitulate the means by which the Course has been made as complete and perfect as possible. A staff of experts skilled in the preparation of such training courses for salesmen has carried out, from a third-party unbiased standpoint, but having particular regard to the customer's non-technical and self-interested point of view, a thorough investigation (*a*) of all the problems connected with the persuasion of the customer to use gas for each of the various purposes for which it can be used, advantageously to the customer, in all the various types of homes or places of business (other than Factories and Workshops), and (*b*) of the points of dispute that arise between the customer and undertaking in connection with the use of gas which may imperil the goodwill of the customer. This they have done (1) by interviewing representative executive officers of gas undertakings of various sizes, locations, and ownerships; (2) by interviewing experienced showroom attendants and other gas salesmen in various districts; (3) by paying *incognito* "shopping" visits to various showrooms both gas and electrical; (4) by paying visits to gas consumers; (5) by spending time in showrooms, or on the districts of various undertakings in company with their officers; and (6) by interviewing the makers of appliances. The information so obtained has been analyzed, classified and tabulated, and fully discussed with the Association's Commercial Education Committee before being utilized as the basis for the course of instruction. The B.C.G.A. Domestic Gas Salesmanship Course was then drafted, submitted to and discussed with the Committee; and is therefore in every sense a course based on the best practice and advice of Gas Salesmen and approved by Gas Salesmen for Gas Salesmen.

The Course, which is available only to those engaged in the gas industry, consists of (1) six hand-books to be issued to students, approximately one each month according to the progress made; (2) manuals for the conduct of group meetings for discussions and demonstrations arising out of the subject matter of each hand-book at monthly meetings. These will be organized either by the Salesmen's Circles or by individual undertakings or by groups of undertakings where such are possible and desired. Each hand-book concludes with a problem or problems (involving a number of questions) to be solved by the student, whose answers will be corrected, graded, and carefully criticized for his help and future guidance. Students satisfactorily completing the Course will be awarded certificates by the Association.

The hand-books will constitute valuable works of reference and guidance for a very long time.

We have seen the first of the handbooks, which leaves no doubt whatever as to the utility of the Course to every gas salesman of whatever age and experience. Obviously it is planned by experts, and, what is so important for a spare-time study, it is interesting and often, if we dare say so, amusing.

How to Enrol.

As already stated, the Course is now ready. Instruction can only be obtained by students by correspondence from the B.C.G.A., but group meetings for discussions and demonstrations will be arranged wherever possible, as they form a very desirable part of the Course.

Application, which may be made at any date, must be sent in writing upon the proper form to be obtained from the Secretary of the Association. It must be accompanied by (*a*) a certificate from the applicant's employer, or such other evidence as may be accepted by the Committee that the applicant is engaged in the gas industry; (*b*) the fee of £6 6s.; (*c*) particulars of the other examinations passed required for the Gas Salesman's Certificate; and (*d*) particulars of any other useful successes, such as in Literature, Elocution, or Drawing, which the student desires to be endorsed at the Committee's discretion upon the Gas Salesman's Certificate when obtained.

It is necessary to understand quite clearly that the only qualification for taking the Course is that the student is engaged in the gas industry. While the other items of the Scheme—technical and economic—are part of a general training recommended, the Sales Course can with advantage be studied by every gas salesman, whatever his technical knowledge and selling experience may already be.

Certification.

Examinations on the Technology and Economics Courses are to be held at stated periods and centres, and at the end of each student's Salesmanship Course an examination paper is to be set which will be answered by the student at home. On the results of these examinations, combined with the already existing Education Scheme of the Institution of Gas Engineers, graded certificates will be awarded by the Association as follows:

A Gas Salesman's Commercial Certificate First / Second Class*	will be awarded to students who have passed First / Second Class in (i.) Gas Sales Technology *and* (ii.) Domestic Gas Salesmanship.
A Gas Salesman's Technical-Commercial Certificate First / Second Class*	will be awarded to students who have obtained a Certificate in (i.) (*a*) I.G.E. Ordinary Grade Gas Supply, *or* (*b*) I.G.E. Gas Supply Practice, *or* (*c*) Gas Fitting Final Grade, *or* (*d*) City and Guilds of London Institute Ordinary Grade Gas Supply, provided in this last alternative the student has been engaged upon the practical or sales (as opposed to the clerical) side of the industry for at least two years since the certificate was obtained *and* have passed First / Second Class in (ii.) The Economics of Gas Supply, *and* (iii.) Domestic Gas Salesmanship. (N.B.—The holding of a second-class certificate in the technical section [(i.) above] will not prevent the granting of a first-class Technical-Commercial Certificate if a first-class pass is obtained in Sections ii. and iii. * It is not essential to obtain this certificate as a preliminary to obtaining the Advanced certificate.)
A Gas Salesman's Advanced Technical-Commercial Certificate First / Second Class	will be awarded to students who have obtained a First / Second Class Certificate in (i.) (*a*) I.G.E. Higher Grade Gas Supply, *or* (*b*, C.G.L. Institute Honours Grade Gas Supply, provided in this last alternative the student has been engaged upon the practical or sales (as opposed to the clerical) side of the industry for at least four years since the certificate was obtained, *and* have passed First / Second Class. (ii.) The Economics of Gas Supply, *and* (iii.) Domestic Gas Salesmanship. N.B.—To obtain a First-Class Advanced Technical-Commercial Certificate the student must obtain a First-class pass in all sections (i.), (ii.), and (iii.).
A Gas Salesman's Diploma	will be awarded to students who hold a Gas Salesman's Advanced Technical-Commercial Certificate; submit (1) a suitable thesis on some aspect of Gas Salesmanship, and (2) evidence of work done in the development of Gas Sales; and pass an Oral Examination.

In the examinations of the Association a pass in the First/Second Class is awarded to a candidate who has obtained not less than 70/50 p.ct. of the possible marks in the Examinations, or in the case of Domestic Gas Salesmanship of the possible marks for work in the course and in the final examination.

ON THE - - - - ELECTRICAL SIDE

Items of Interest to the Gas Industry

Unprofitable Electricity Showrooms—and Cookers.

In their report on the accounts of the Ashton-under-Lyne Corporation for the year ended March 31, 1930, the Elective Auditors remark that an electric cookers' account, which deals with cookers hired out to householders, shows a loss to the town of £1010 for the year. They also criticize from a financial point of view the policy of continuing the showroom in Stamford Street, which appears to them unwarranted. The total cost of the showroom for the year, they say, was £665; and "with a profit of only £70 on the sale of fittings, it appears that £595 has been spent in one year in advertising electrical goods sold by private traders. There will, of course, be an increased consumption of current by the sale of fittings; but unless it can be shown that the profit on such increased consumption approximates to the cost (£595), we can see no justification whatever for the showrooms, even as an advertising medium."

Report of the Electricity Commissioners.

It was stated in the tenth annual report of the Electricity Commissioners, which was issued a little while back and which dealt with the financial year to March 31, 1930, that the general decline during the year in the amount of employment in a number of important industries—such as engineering, shipbuilding, and the textile trades—was not accompanied by any corresponding decrease in the total output of electricity undertakings as a whole. In spite of the lack of any particular industrial stimulus, the sales of electricity by authorized undertakers in the year 1929 showed an increase of 993 million units, or nearly 13 p.ct., on the sales in 1928; while the output (units generated) by authorized undertakers during the twelve months ended March 31, 1930, amounted to 10,526 million units, representing an increase of over 1053 million units, or upwards of 11 p.ct., on the corresponding figures for the previous twelve months. The expansion of the supply industry during the post-war period has been characterized by a substantial growth in both the industrial and the domestic demand for electricity. In the case of the power load, the annual increases have varied considerably by reason of the fluctuating conditions of trade in the country. The domestic demand, on account of its nature, has not been affected to the same degree and has exhibited a steadier progressive growth.

Depression Affects Sales at Sunderland.

In the case of Sunderland, the remarks of the Commissioners at the close of the above paragraph are borne out by a paragraph which has appeared in the Press. This paragraph indicates that depression in trade has made its mark on the receipts of the Sunderland Electricity Department. The amount of current sold during the twelve months to the 31st ult. is estimated at 33,000,000 units, as against 37,000,000 units in the previous year. The sale of power to industrial concerns fell from £95,872 to £79,062; but owing to the development of domestic and general lighting and heating, an increase is anticipated—£88,044, against £82,539 in 1929-30.

Importance of the Domestic Load.

The Commissioners, in the course of their report, point out that experience has served to emphasize the importance of cultivating the domestic load, not only because of its great potentialities, but also because of its value as a stabilizing factor in the continued development of the industry. The figures just quoted are evidence of the soundness of this advice—should such evidence be needed. As a matter of fact, however, there is every reason to believe that the electrical industry are as fully alive to the merits of this portion of their load as are our own salesmen when gas is in question. One section of the report reviews the progress made up to March of last year in the establishment and development of supplies in the less populated portions of the country comprised in rural areas. Returns from 223 undertakers showed that upwards of 203,000 consumers had been obtained at the end of the year, and that over 184,000 of these, or more than 90 p.ct., were of the domestic consumer class. The number of farms and factories connected to the various systems was small, representing in each case less than 1·5 p.ct. of the total number of consumers. There were 1042 "large consumers" who took 15,000 units or over during the year.

The Farmers' Patronage.

The slowness of the farmer in coming forward to seize the blessings which electricity is supposed to offer him—a slowness which we have all along anticipated—was further illustrated at the annual meeting of the Rural Reconstruction Association. On that occasion Mr. R. Borlase Matthews, who presided, deplored the slow progress made by electricity in spreading over the countryside. "If," he said, "each farm worker could have three horse-power at his elbow, his output could be very considerably increased. Some five years ago there were only about 500 farmers in this country taking advantage of electricity. To-day the figure had increased to 3500, but why should it not be 350,000? He thought the price the Board asked for their current was very high. In one undertaking in which he was interested they were asking 1·9d. a unit delivered at their station. He could generate himself at that station at something over 0·3d. a unit. That was the price at which they began to distribute, and the Board's price would mean about 1s. a unit for light and 4d. a unit for power to the consumer." In this, one realizes the vital part played by distribution costs in electricity supply schemes involving the more sparsely populated areas.

Popularizing Gas Heating in Burnley

This photograph is of a display exhibited in the showroom window of the Burnley Gas Department. The display consisted of a "Panella" fire; and, by utilizing a panelled plate-glass firescreen about 3 ft. away from the fire, it was possible to light the fire in the window without damage. The photograph was taken at night time, the window being illuminated by concealed ruby lighting behind the stained-glass portion of the window, in addition to the decorative lighting fittings which are visible. The window is also lighted externally by two 1000 c.p. high-pressure lamps, and a 16-mantle panel strip lamp with a ruby lettered sign advertising gas lighting.

Two of the cards displayed in the window contained the following matter: "Compare gas, which costs only ¼d. per unit all in, for cooking, lighting, and heating; for power users ¼d. per unit." "This 10-radiant 'Panella' fire is costing under 1d. per hour for gas, and will efficiently heat a room 16 ft. square." The colour scheme was very effective, and the display created a large amount of interest.

THE NEWS OF THE WEEK

The Oriental Gas Company, Ltd., announce an interim dividend at the usual rate of 3½ p.ct., *less* income-tax, on account of the year ending June 30 next.

The Bradford Gas Committee have decided to allocate £10 for prizes to be awarded locally in connection with the "Fairy" gas competition organized among school children by the British Commercial Gas Association.

The Hereford Gas Committee have asked the City Council for permission to apply to the Ministry of Health for sanction to borrow £8000 in order to cover the cost of installing 1500 gas cookers in the city, and the purchase of a further 1000.

The North of England Association will hold their annual meeting in Newcastle on Friday, May 1 (2 p.m.). The papers to be submitted are as follows: "Experiences in Small Gas-Works," by Mr. T. Law, of Malton; and "The Industrial Gas Field," by Mr. J. E. White, of Newcastle.

The Model Railway Exhibition opened at the Central Hall, Westminster, yesterday afternoon and will last until April 18. This exhibition is run by the Model Railway Club, which was founded in 1910, and whose membership exceeds 300. The object of the Club is to bring together all who are interested in this hobby, and the diversity of the models shown at this Annual Exhibition demonstrates how wide is the field of model railway engineering.

The British Gas Light Company has applied to the Board of Trade for a Special Order vesting in it the gas section of the business of the Flint Gas and Water Company. The intention is to attach the new acquisition to the Holywell, Greenfield, and Bagillt undertaking, which it adjoins and which the British Gas Light already controls. The Flint Company was formed in 1852, and is a dividend-paying concern. Its gas business is up to date and progressive, and should work in advantageously with the Holywell system. Sales have approximated to 24 million c.ft.

The Clean Coal Company, Ltd., has received an order from Messrs. Samuel Fox & Co., Ltd., of the United Steel Companies, Ltd., for a dedusting and cleaning plant to deal with the whole output of the coking coal from their Stocksbridge Colliery. Other orders received recently include a dedusting plant for the preparation of coal for the existing washery at the Smithy Wood Pit of Messrs. Newton, Chambers, & Co., Ltd. (this in addition to the complete cleaning plant in course of erection at their Rockingham Colliery), and a dust extraction plant to deal with a throughput of 250 tons per hour of coal at the Annesley Colliery of the New Hucknall Colliery Company, Ltd.

The Directors of the Bombay Gas Company submit the following statement of accounts for the year ended Dec. 31, 1930: The revenue account shows a profit for the year of £24,027 19s. 8d., which sum added to the profit on exchange £5488 7s. 5d., and the balance of £36,993 0s. 10d. brought forward from the previous year amounts to £66,509 7s. 11d. After providing for the payment of interest and the interim dividend paid in November last and the addition of £1816 14s. to the reserve fund and £237 10s. to the renewal and contingency fund, there remains a balance of £52,766 3s. 11d., out of which the Directors recommend the payment of a dividend of 4½ p.ct. (less income-tax), making 8 p.ct. for the year, which will leave £39,266 3s. 11d. to be carried forward to the current year.

A Pioneer of Electricity on Tenants' Freedom.

Writing to the "Sussex Daily News," Mr. H. G. Massingham, of Brighton, says:

"As one of the early pioneers of electricity, I quite agree with the Gas Company's contention that in respect of Council property 'householders should have freedom of choice.' In my own house I use gas as freely as electricity."

The Institution of Gas Engineers' Examinations, 1930.

Report of the Board of Examiners.

The Board of Examiners has submitted to the Gas Education Committee, for presentation to the Council of the Institution of Gas Engineers, its Report on the Examinations held in 1930 under the Education Scheme.

During the year 1929-30, the members of the Board of Examiners and the Assessors appointed by the Council were: *Examiners:* Messrs. W. J. Smith, B.Sc. (Bolton, Chairman), T. Carmichael (Portsmouth), R. Robertson (Bristol), Harold C. Smith, M.Inst.C.E. (London), John Terrace, M.Inst.C.E. (London), J. Stanley Thorman (London)—Gas Engineering; S. B. Chandler, A.M.I.Mech.E. (London), H. R. Hems (Birmingham), E. F. Keable (Gorleston-on-Sea), Stephen Lacey, B.Sc., M.Inst.C.E. (London), A. B. Roxburgh (Newcastle-upon-Tyne)—Gas Supply. *Assessors:* England and Wales: W. J. Smith, B.Sc. (Bolton)—Gas Engineering; Stephen Lacey, B.Sc., M.Inst.C.E. (London)—Gas Supply. West of Scotland: George Keillor (Greenock) and John W. McLusky, M.I.Mech.E. (Glasgow)—Gas Engineering and Gas Supply. East of Scotland: H. H. Gracie (Edinburgh) and J. W. Napier (Alloa)—Gas Engineering and Gas Supply.

Ordinary Grade Certificate in Gas Engineering.

In the Examination for the Ordinary Grade Certificate in Gas Engineering, both internal and external candidates answered the questions fairly well, but the sketches were generally poor and did not adequately illustrate the functions of the plant drawn. Many candidates could have made better use of the English language, while few appeared to possess a sound practical knowledge of the subjects set, especially of the structure of plants.

The work of the internal candidates had improved. Several excellent papers were submitted by external candidates, but generally the standard was lower than last years.

Higher Grade Certificate in Gas Engineering.

In the Examination for the Higher Grade Certificate in Gas Engineering, the questions had frequently been imperfectly understood, indicating that candidates did not read them properly and endeavour to appreciate their significance. Of the few candidates who attempted the question on coal, none showed a reasonably satisfactory knowledge of this important subject. The stereotyped nature and inadequacy of the answers in the papers from certain localities indicates that the sources of information relied upon, or the instruction given, were less satisfactory than in other districts.

Diploma in Gas Engineering.

In the Examination for the Diploma for Gas Engineering, the standard of the candidates was lower than in the previous year, especially in the Oral Examination and when dealing with the construction, foundations, and structural capacity of plant and buildings, and drainage and effluent treatment systems.

Ordinary and Higher Certificates in Gas Supply.

The substantial improvement recorded last year in the Examinations for the Ordinary and Higher Grade Certificates in Gas Supply has been well maintained, and candidates (whose numbers increase) continue to progress in applying their knowledge of ancillary subjects to the main subject.

Minor Course Certificates.

The Report of the Examiners of the City and Guilds of London Institute on the Examinations for Minor Course Certificates in Gas-Works Practice and Gas Supply Practice indicates that fair average knowledge was shown in the

former, while there was a distinct improvement in the latter subject. Clear line sketching, however, required more attention. The standard of work in Elementary Science was distinctly good. The Report of the Examiners in Gas Fitting states that the general standard of the answers showed an improvement on the previous year, particularly in the Final Examination, but sketching was often poorly done. The answers in the *Viva Voce* Examinations were generally satisfactory.

B.C.G.A. Scottish Conference.

This Conference will be held in the Technical College, Galashiels, on Thursday, April 30, under the Presidency of Mr. James Dorward (Chairman of the Galashiels Gas Light Company). The following programme has been arranged:

MORNING SESSION.

10.30 a.m. Official welcome by Mr. James Dorward.

Address on "Gas Service in Home and Industry," by Sir Francis Goodenough, C.B.E.

Paper entitled "Gas Possibilities for Water Heating in a Dwelling House," by Mr. A. H. Barker, M.Inst.C.E.

Discussion, in which the following will take part: Messrs. H. H. Gracie (Edinburgh), Alex. Dow (Galashiels), J. W. McLusky (Glasgow), G. Keillor (Greenock), and others.

12.45 p.m. Adjournment to Douglas Hotel for lunch, at the invitation of the Galashiels Gas Light Company.

AFTERNOON SESSION.

3. 0 p.m. Public Conference.

Opening remarks by the President of the Conference.

Subject for discussion: "Atmospheric Pollution," by Col. P. S. Lelean, C.B., C.M.G., F.R.C.S., D.P.H. (Professor of Public Health at Edinburgh University).

Discussion to be opened by Dr. G. M. Elliott, M.B., Ch.B., D.P.H. (Medical Officer of Health for the County of Selkirk), followed by Messrs. H. G. Ritchie (Falkirk), D. Fulton (Helensburgh), and others.

Nottingham Gas Frauds.

Report to the City Council.

The report of the Nottingham General Purposes Committee on the recent Corporation Gas Department frauds, issued on April 7, includes the following recommendations, which were made to the City Council last Monday:

(1) To instruct the Gas Committee to make such arrangements as may be necessary to bring into effect a re-organization of the Gas Department on the general lines recommended by Messrs. Hubbart, Durose, and Pain (the accountants who conducted the investigations).

(2) To authorize the General Purposes Committee to decide what action shall be taken as regards the officers mentioned in the report. On the latter recommendation, the Committee draw attention to an amount of £3000, alleged to have been expended by the prisoner Gardiner in presents to officials and men in the Gas Department.

The Committee further recommend the Council to empower them to inquire fully into the matters in question, and to deal with all the persons involved therein by dismissal, reduction, loss of seniority, or in such other manner as the circumstances may in each case warrant.

"Neither the Gas Committee as a whole, nor the Accounts Sub-Committee in particular," the report states, "can escape responsibility in a general sense in connection with these irregularities, and it is quite clear from the terms of a resolution of the City Council that the City Treasurer and the General Manager of the Gas Department must share responsibility with the Gas Accountant.

"We think it is fair to assume that if the instructions of the City Council had been properly and strictly carried out, the series of frauds, at that time just beginning, would in all probability have been discovered, and the proper remedial measures would then have been taken to prevent their recurrence.

"As far as we have been able to discover, no attempt was made either by the City Treasurer or the General Manager to discharge the duty imposed upon them by the City Council for the supervision of the Gas Accountant and his Department, nor did the Gas Committee, so far as we are aware, ever inquire whether this was done nor take any steps to see that the City Council's directions were followed. . . . We can find no trace of any consideration having been given at any time to the very important subject of internal check.

"Both in the Engineer's Department and in the Accountant's Department there was a complete disregard of the fundamental principle of administrative procedure, which makes it incumbent upon those responsible for the management to prevent any openings being left in the scheme under their care, by utilization of which any employee, however humbly placed, might be tempted to commit a fraud, which, in the circumstances of a more perfect organization, he would not for a moment have considered, due to the risk of rapid detection.

"Although it may be said that the General Manager, having regard to his position, must share the responsibility for the neglect to see that this elementary principle was being properly applied within the undertaking, the primary responsibility in this respect undoubtedly rests upon the Gas Accountant.

"On this subject, it is not our intention to suggest that an elaborate and costly system of 'super control' should be established to prevent irregularities, but rather that all reasonable precautions should have been taken.

"Two serious deficiencies which existed in the organization afforded loopholes which were taken advantage of by Leonard Ball: (1) there was no system of stock accounts in existence, which would have enabled the purchase and consumption of stores and other goods to be checked; (2) the whole responsibility for the ordering of goods and verification of prices, and the receipt of the goods was concentrated in the clerical department of the Gas Engineer's Office.

"The absence of any stock accounts is a grave flaw, and it is unusual in these days to find an undertaking of such magnitude which does not maintain a very strict control over the purchase and consumption of materials by means of such records."

Ministry of Health Inquiry at Porthcawl.

A public inquiry was conducted by Mr. G. Carlyle, of the Ministry of Health, at Porthcawl on April 9 into the application of the local council to borrow £18,650 for the enlargement and modernizing of their gas-works.

The Council's Consulting Engineer, Mr. Ferguson Bell, gave evidence in support of the application and claimed that if the scheme was carried through there would be a reduction eventually of 1s. 3d. per 1000 c.ft. of gas in Porthcawl. The scheme would put the Porthcawl gas-works on a better footing than ever before.

Mr. Evan Lewis, Chairman of the Council, said the resolution to go forward with the scheme had been carried with only three dissentients.

Mr. D. Davies, a member of the Council, opposed the proposal on the ground that the Council had already outstanding loans amounting to £33,000 on the present gas-works. He favoured spending £6000 or £7000 on the existing works and urged that such improvements would, in his opinion, bring down the price of gas at Porthcawl.

Handsome New Showrooms at Cork.

A striking and very attractive addition to Cork's modern and up-to-date buildings has recently been completed, and the unremitting care and thought taken at every stage of its design, erection, and furnishing have resulted in premises admirably suited to the purpose for which they are intended. The building referred to is the handsome new suite of showrooms which the Cork Gas Consumers' Company have constructed at the important corner, No. 1, Patrick Street—the city's principal shopping thoroughfare. The following account of the showrooms is taken from the "Cork Examiner."

The whole house, inside and out, has been designed to demonstrate the utility and unrivalled convenience of gas lighting, heating, and cooking. Cork has been provided with a novel and very pleasing landmark in the form of a low tower surmounting the building, flanked by large bronze, gas-lit lanterns, and terminating in a glazed gas-lit dome, the whole giving, when illuminated, an impressive effect of light, brilliant yet soft and mild, which can be clearly seen from a considerable distance. The ground floor is treated externally in polished grey granite with black capping and plinth, the window being framed in moulded bronze. These windows are lighted externally by gas lights contained in green enamelled lanterns, and the soft shade of green is repeated in the metal fascia letters and in all the windows over.

The ground floor constitutes an extremely handsome

THE NEWS—*continued.*

showroom, and it is so arranged that all its contents can be clearly seen from the street. A varied assortment of domestic cooking appliances utilizing gas fuel is tastefully arranged inside. From this showroom one reaches a second one of equally fine appearance on the first floor, specially planned for the exhibition of modern gas fires and gas lighting fixtures, placed in attractive settings. On the second and third floors are comfortable residential flats, reached by a separate entrance on Merchants' Quay.

The building work was carried out by Mr. P. J. Hegarty, of Cork, to the designs of the architects, Messrs. Chillingworth & Levie, of Cork.

The successful completion of such an ambitious project is a very remarkable indication of the progress made by gas for domestic and industrial purposes. The developments in the utilization of gas for lighting, cooking, and heating have, in recent years, been so numerous in Cork that the Company found that they could not be restricted by the limitations of the existing showrooms at 72, South Mall, and it was for this reason that they secured and reconstructed No. 1, Patrick Street. A most varied choice of gas apparatus for all household purposes, tempting to householders of every class, wealthy and poor, will be displayed henceforth in this excellent building.

The lighting arrangements include handsome ventilating lamps, and the lights in the cupola and lanterns of the tower, as well as the external lamps, are controlled by time controllers.

In the showrooms there are several types of switches for lighting and extinguishing ordinary burners from any convenient point—a development of the utmost importance from the point of view of convenience and economy.

When the Light Failed.

The following rather amusing extract appeared in the "Yorkshire Evening Post" of April 7, in connection with an electric light failure in Leeds on Easter Monday:

When the electric light failed on the north side of Leeds last night, a Headingley resident remembered that during a previous failure he solaced the twenty minutes of darkness with his wireless set.

So, last night, he did not fret, or rush about or bother with candles, but prepared to enjoy another little concert in the dark. He switched on the set, waited for what seemed rather a long time—and then remembered that since the last electric current failure he had invested in an all-mains wireless outfit!

Chester Gas Company Co-Partnership Scheme.

The members of the co-partnership scheme of the Chester United Gas Company met in the Recreation Room at the works on Monday afternoon, March 30. Sir John Frost (Chairman of the Board of Directors) presided over a large attendance of employees.

The Chairman, in moving the adoption of the report and balance-sheet, said: I can once more congratulate you all upon the continued success of our Company's activities and of our co-partnership scheme. The allocation by the Directors to the co-partnership fund provides, as in previous years, a bonus of 6½ p.ct., and amounts to £1442. I hope that after the distribution of the pass books at the close of this meeting, there will be very little inclination to apply for withdrawals. The Committee and I appeal annually for a substantial reduction in withdrawals, and the appeal is made entirely in your own interests. It is self-evident that if the bonuses are allowed to accumulate and earn interest, or, better still, are invested in the Company's stock, they are fulfilling one of the objects of the scheme by becoming of permanent benefit to you. It is extremely pleasing to know that individual co-partners have purchased, during the year, £1300 of the Company's ordinary stock, and that your holdings of stock now amount to nearly £6000, in addition to which the total of your pass book balances is almost £3600. Such figures are evidence of the benefits conferred by the scheme and of its healthy condition.

It is now thirty years since our first profit-sharing scheme was inaugurated. That scheme was in operation until 1918, and throughout those 17 years the average of the annual bonus was £337. The effect of the war upon prices of all commodities was responsible for the suspension of profit-sharing with us for five years. In the meantime power was obtained for the organization of our new co-partnership scheme, which has now been in operation eight years, with an average annual allocation of bonus of nearly £1400. The number of employees who have shared in this special way in the Company's prosperity has grown from 65 in 1901 to 144 to-day, another sign of constant progress. Quite a number of the staff of thirty years ago are still in the Company's service, and some have retired on pension.

Unusually long service was recognized in the retirement over a year ago of Mr. C. P. Jones, of the collecting staff, after 49 years with the Company; and quite recently of Mr. Daniel Sconce, who had given 52 years of devoted service, and had been a recognized and valuable link between the Company and the public it supplies.

Mr. A. Eaton seconded the resolution, which was carried unanimously.

Two Clocks New York Depends On.

While the west side asks that eternal question, "What time is it?" of the Jefferson Market landmark, the east side watches the gigantic hands of the Consolidated Gas Company's tower clock, which can be seen from far distant points in all directions. Although the Irving Place timepiece has been ticking away from its lofty setting less than two years, the neighbourhood for blocks around has come to rely wholly upon it in matters of moment. A prominent resident of lower Fifth Avenue illustrated this when he called the Gas Company to suggest that it light the clock faces three minutes earlier, on account of the shortening daylight hours. At the end of 1930 the Consolidated Gas Company had 97,000 stockholders.—"Gas Logic."

Shadows that Trap the Pedestrian.

Councils Tackling Street Safety Problems.

More than two hundred borough and district councils have now appointed public lighting engineers or lighting superintendents to give expert advice as to the system of street lighting which may provide the greatest degree of safety for both motorists and pedestrians in their areas.

This is good news for all who use the roads at night whether on foot or in vehicles; for, although so many other road problems have been considered and made the subject of legislation recently, the vital question of street lighting and its effect upon the number of road accidents at night appears to have been hitherto almost completely neglected.

Many motorists who have taken their cars out to drive during the past few weeks, when lighting-up time was comparatively early, and a half-day or week-end run usually meant returning at night through towns, have declared their surprise at the continued variation in lighting systems and quality in different areas.

"Better no light at all than a poor light," is a well-known motoring axiom, for if the motorist can use his headlights he can drive safely. But he cannot use his headlights in the town and he must then rely upon the local authority to light his way.

SHADOW CAMOUFLAGE.

"If street-lamps are 'staggered'—that is, if they are placed alternately on opposite sides of the road—the motorist finds himself continually passing through a pool of light and then into comparative darkness as he passes one lamp after another," said a prominent lighting authority in an interview.

"If the light is harsh, and comes from one glaring point, the result is to intensify the motorist's difficulty and confusion. Again, if the street lamp does not throw a strong, even light over the entire road surface, the presence of other lights such as those in shop-windows will help to create a weird maze of brilliance and shadow which effectively camouflages a person crossing the road, with the result that it may be too late to avoid an accident when the motorist sees him.

"Only recently at a South London inquest upon a child who was killed when crossing the road, evidence was given that the lighting was so confusing that the motorist did not see the child until after the accident."

In South London, great progress has been made with the standardization of the lighting of the main roads of six boroughs. The system adopted—it has also been adopted in parts of North London—is that of overhead, high-pressure gas lamps. These overhead lamps throw an even light all over the road. In addition, gas has the merit of being free from glare and sheds a soft, slightly yellow light which is very penetrating, especially in fog.

Several provincial towns have also adopted this system which in most cases, it is claimed, is cheaper than other illuminants.

"Most motorists seem to find electric light too glaring, and too apt to concentrate the light in one particular spot. This illuminant also, is usually expensive, an important factor when it is remembered that ratepayers themselves have to foot most of the bill for making the roads safe to walk or drive along," added the authority.

Gas and Electricity Comparisons at Brighton.

A " show-up " of the methods employed to further the interests of municipally supplied electricity has been made by the Brighton and Hove General Gas Company in a recent announcement in the " Sussex Daily News."

The Brighton Corporation (said the advertisement) propose to equip 193 artisan dwellings at Whitehawk Housing Estate with an electric cooker, kettle, wash-boiler, and iron, for which will be made a compulsory charge of 2s. 6d. per week, as part of the rent, of £6 10s. per annum (including the rentals of the appliances), and in addition thereto a charge of ½d. per Board of Trade unit of electricity used, to be supplied through a prepayment meter; thus depriving the tenant of any choice in the matter by the arbitrary exclusion of gas—the more economical and effective commodity—in favour of that supplied by themselves—viz., electricity.

The gas consumer by 1d.-in-the-slot gas meter is provided with gas meter, cooker, lighting fittings, and gas fire at an inclusive price of 11·8d. per therm, and the average payment to the Company by this class of consumer is £6 7s. 10d. per annum for gas and all services, *or less than the proposed fixed charge for electricity before any electric current is used.*

As the average amount of gas sold to the consumer by 1d.-in-the-slot gas meter is 130 therms per annum, his requirements for similar heat-value in electricity would be 3250 Board of Trade units, costing at ½d. per Board of Trade unit £6 15s. 5d., and thus his total annual outlay for electricity would be £13 5s. 5d., or over double that of his expenditure on gas.

The advertisement went on to quote the recent decision of the London County Council that tenants should be afforded freedom of choice in the use, whenever available, of gas or electricity, or both; and urged the tenants on the Whitehawk Estate to claim a free choice and decide whether they would use gas or be prepared to pay an extravagant price for electricity for domestic purposes.

Progress of Coventry's Gas Undertaking.

The remarkable growth of the Coventry Gas Undertaking is outlined in the Coventry Municipal Handbook for 1931, which has just been issued by the Town Clerk's Department.

Established by a company in 1820, the undertaking was acquired by the Corporation in 1884 for £170,345. In the first year of municipal ownership, the Handbook points out, the gas sold was approximately 174 million c.ft., and the capital was at the rate of 18s. 5d. per 1000 c.ft. In 1930 the gas sold was approximately 2443 million c.ft., and the capital was at the rate of 10s. 4d. per 1000 c.ft. The Foleshill Gas-Works have manufacturing plant with a capacity of 12½ million c.ft. per day—viz., horizontal retort section, 4¼ million, continuous vertical retort section, 5¼ million, and carburretted water gas plant, 3 million.

There are two gasholders with a combined capacity of 3,630,000 c.ft. and a waterless holder with a capacity of five million c.ft. Mechanical handling is continuous throughout the process of manufacture, and the works comprise bye-product plants for making liquid and sulphate of ammonia, tar, benzole, ammonium-sulphocyanide, and sulphuric acid. At the Gas Street Works there are two holders whose combined capacity is 1,564,000 c.ft. The Kenilworth Works, acquired last year at a cost of £38,500 are being continued for manufacture for the present, though the intention is eventually to supply the Kenilworth area from Foleshill.

The amount of coal carbonized each year is approximately 145,000 tons, and about 1083 tons of oil is used in the manufacture of water gas. There were 47,676 consumers at March 31, 1930, of whom 35,833 favoured the prepayment method. The authorized area of supply comprises 122 square miles, and there are 273 miles of mains. With the exception of 1928, when there was a loss of £24,750, the undertaking has made profits from 1921 to 1930 (both years inclusive), the smallest being £15,913 in 1929, and the largest £87,462 in 1923.

Wellington (Salop) Gas Company Dinner.

Directors and employees of the Wellington (Salop) Gas Company dined together recently, when Mr. R. J. Milbourne (Vice-Chairman of Directors) occupied the Chair in the absence of Mr. C. W. Leake (Chairman). He was supported by Mr. S. Lea (Director), Mr. H. J. Woodfine (Managing Director), and others. In toasting " The Wellington Gas Company and the Board of Directors," Mr. E. Parker, of the clerical department, spoke in glowing terms of the business aptitude of the Directors and the Managing Director, and extended congratulations on behalf of the employees to Mr. Woodfine on his having been elected President of the Midland Association of Gas Engineers and Managers.

Mr. R. J. Milbourne, who responded, paid a tribute to the enthusiasm of the employees, and said but for that the undertaking would not be so successful.

The toast of " The Employees " was submitted from the Chair, and Mr. Woodfine, responding, said that as far as service was concerned, the Wellington Gas Company was efficient throughout the district, and the wants of the consumers were looked after by an energetic staff who were always prepared to give help and advice in the proper use of gas and its equipment.

British Glassware Exhibition at Selfridges.

At the Second Glass Convention held at Buxton in Septemper, 1930, Mr. Gordon Selfridge, speaking on " Publicity and Propaganda in the Glass Trade," made the following offer to the British Glass Industry:

> If your representatives in London care to furnish us with a sufficient supply of sufficiently interesting things to make up a display of the extreme variety of goods that you make in the Glass Trade in this country, we will give that display one or more windows.

This very generous offer was gladly accepted by the Glass Convention Committee, who passed it on to the Glass Manufacturers' Federation to carry into effect. The Federation, in pursuance of its aim to serve the interests of all sections of the glass industry as the central employers' organization in the industry, formed a special Exhibitions Committee, representative of all sections, which has organized the present Exhibition in conjunction with Messrs. Selfridge & Co.

At this Exhibition, which is open from April 13 to 18, are examples of illuminating glassware for use with gas lighting, including a Sugg globe and other heat-resisting fittings.

Demonstrations of glass blowing are being carried out with the help of a special gas burner.

The chief object of the Exhibition is to remove a common and very erroneous impression that glass making in this country is a decaying—indeed, a very much decayed—industry. Such an impression is far from the truth, for while special difficulties have to be encountered by reason of severe competition from countries where wages are low, it is a fact that about two-thirds by value of the glass used in this country is also made here.

Smaller Homes Adopt Gas Househeating.

The small six and seven room house in the metropolitan and suburban area is following the more luxurious residence in adopting automatic heating methods, according to figures made public recently by the Consolidated Gas Company of New York.

On Jan. 1, 1930, in the territory served by the Consolidated and its affiliated gas companies, the average house using gas for heating contained 630 sq. ft. of radiation. On Oct. 1, following the reduction in gas heating rates in August, this figure had dropped to 567 sq. ft., indicating the installation of gas heat in many homes of the smaller type. The same trend was apparent in the territory served by the Westchester Lighting Company, where the figure of 600 sq. ft. on Jan. 1 decreased to 571 sq. ft. on Oct. 1.

During this period, there was an increase of more than 35 p.ct. in the number of gas heating installations in the territory served.

Mr. N. T. Sellman, Director of Sales and Utilization of the Company, expressed the opinion that two causes were primarily responsible for the recent adoption of automatic heat by the smaller type of dwelling.

" The reduction in the gas rate for heating made on Aug. 1 undoubtedly has brought this service within the reach of additional customers, many of whom live in houses of the more modest type and size," Mr. Sellman said. " The other influence is the growing realization on the part of many home owners that the small, servantless home needs automatic heat just as much as the larger home, where the added comfort and convenience of automatic heating methods have been demonstrated.

" Since Aug. 1 to the middle of November, nearly 450 house heating installations have been sold by this Company and its affiliated gas companies, serving Manhattan, Bronx, Westchester County, and portions of Queens. On Nov. 1, there were more than 2150 homes heated with gas in the territory served."

FREDRICK ACCUM

This account of the activities of an early pioneer of gas lighting is taken from the current issue of the Co-Partners' Magazine of the Gas Light and Coke Company

Fredrick Accum was one of the early pioneers of gas lighting and a member of the original Board of Directors of the Gas Light and Coke Company in 1812. He was born on March 29, 1769, in Hanover, came to this country as a chemist in 1793, and very soon began to establish a reputation for himself in scientific circles in London. In 1800 he equipped a laboratory and established a business in Old Compton Street, Soho, where he gave private lectures to students in experimental chemistry and took resident pupils, who worked in the laboratory under his personal supervision. In addition the laboratory was used for the examination and analysis of commercial products and also as a supply house for apparatus and chemicals. Accum, at this time, has been aptly termed " merchant, analyst, lecturer, teacher, and popularizer of chemistry," and perhaps the best picture of his activities is given by his business cards and letter heads, which stated that *" Mr. Accum acquaints the Patrons and Amateurs of Chemistry that he continues to give private Courses of Lectures on Operative and Philosophical Chemistry, Practical Pharmacy and the Art of Analysis, as well as to take Resident Pupils in his House, and that he keeps constantly on sale in as pure a state as possible, all the Re-Agents and Articles of Research made use of in Experimental Chemistry, together with a complete Collection of Chemical Apparatus and Instruments calculated to Suit the convenience of different Purchasers. Philosophical Gentlemen residing in the Country or Abroad, desirous of becoming purchasers of large or small Collections of Chemical Preparations, &c.. may have explanatory Lists previously made out agreeably to the Expense they are willing to incur, and Chemical Catalogues may be had at the Laboratory, Old Compton Street, Soho, London."*

Accum's chemical supply house became well known. He supplied chemicals and apparatus to Yale and Harvard Universities in the United States, and several of the early colleges in that country were fitted up by him.

Such a quaint mixture of activities whereby the Professor of Chemistry is also keeper of a chemical store, strikes us to-day as strange, but a hundred years ago it would have created no comment, and it must not be thought that Accum was in any sense a quack. Such was very far from being the case. An examination of the numerous books and papers written by him reveals a very high standard of scientific work. Two of his books—" A Practical Treatise on Gas-Light " and " A Treatise on the Adulteration of Food and Culinary Poisons "—made his name widely known in both Europe and America.

[*From an original painting by S. Drummond, A.R.A.*

FREDRICK ACCUM.

The Gas Light and Coke Company's First Chemist.

In 1801 Accum was appointed Chemical Operator at the Royal Institution, where he worked with Sir Humphrey Davy, and his growing reputation finally led to his appointment in 1809 as Professor of Chemistry at the Surrey Institution, Blackfriars. His skill and ingenuity in the construction of apparatus became recognized at an early stage, and his display of these talents before the fashionable audiences at the Royal Institution created very favourable comment. Later, at the Surrey Institution, his lectures rapidly became popular, and were attended by large audiences of both young and old.

Accum's growing reputation as a chemical operator and analyst resulted in a great demand for his services by manufacturers. The records of the time mention his name constantly as an expert in important chemical cases, and he was frequently called upon to perform chemical work for the Government.

The work in technical chemistry for which Accum is best remembered is that connected with the introduction of gas lighting. He was already interested in this subject when,

in 1803-4, F. A. Winsor gave the first exhibition of gas lighting in London, obtained a patent for his process and attempted to incorporate a company for lighting the streets and buildings of London. Winsor's application for a charter from the Government was opposed by William Murdoch, who had given demonstrations of gas lighting outside London several years before, and at the request of Winsor and the other promoters of the new company, Accum conducted a long series of experiments which he afterwards described, in his testimony as chemical expert, before committees of the House of Commons and the House of Lords. Considerable attention was given at these hearings to Accum's account of his experiments in the utilization of the bye-products of gas manufacture. He produced specimens of ammonia, sulphur, oil, tar, &c., which he had obtained, and discussed methods for their utilization. The experiments of Accum upon the distillation of coal tar are important, for they represent the earliest efforts for the utilization of this important substance.

Considerable prejudice was at first aroused against the introduction of gas lighting, and Accum, by his efforts to allay this prejudice, rendered the new industry as great a service as by his chemical researches. In the reports of his testimony and in his books upon gas lighting we see him occupied not only as a chemist, but also as a most skilful propagandist.

The reputation of Accum as a coal gas expert became well established throughout England. He advertised to contract " with any committee, directory, or public company for lighting with gas any town, manufactory, or building upon whatsoever scale of magnitude for an annual specific sum." Among the gas plants which he planned and operated was one for illuminating the Royal Mint. In his fifteen years' association with coal gas technology he saw the art expand from a small experimental undertaking to a firmly-established chemical industry, in which not only gas but also bye-products such as coke, pitch, tar, and ammonia were worked up and sold. In 1815, Accum published his famous " Practical Treatise on Gas-Light," which passed through four English editions in three years and was translated into French, German, and Italian. This book became a classic, for it is the first work in any language that deals with the subject of gas illumination. It has the high standard and thoroughness which one associates with his work.

Accum's interests in industrial chemistry were not confined to gas manufacture. On one occasion, for instance, we find him called in to advise the inhabitants of Thetford on the merits of their mineral spring, and on another, inventing and marketing an iron-welded compound which was extensively used and may be considered the parent of similar modern preparations.

The services of Accum, as a chemical expert, were always in great demand before Government Committees and at trials. His testimony before Parliament in connection with gas legislation has already been mentioned.

Accum published a number of books on foods, and perhaps the most celebrated of all his publications was his " Treatise on Adulterations of Food and Culinary Poisons." The first edition of 1000 copies was published in 1820, and was sold out in less than a month. The exposure of practices which this book contains caused such a stir and such a vast amount of comment that, largely as a result of its influence in directing public attention to food adulterants, the Bread Act was passed about 1830.

In his efforts to popularize chemistry and to bring it home to all classes of people, Accum had made his name known in every intelligent household. No chemist living appeared to be more comfortably or permanently established than he, and yet it was the misfortune of this unhappy man to witness, within a single month, the loss of reputation, business, and friends, owing to an unsubstantiated charge of theft, which was brought against him and was no doubt due to the machinations of interested parties whose nefarious practices he had exposed.

Though a few influential defenders stood by him, we cannot be surprised that he decided to leave England. He returned to his native country, after thirty years in England, and accepted in 1822 the dual position in Berlin of Professor of Technical Chemistry and Mineralogy at the Royal Industrial Institute and of Professor of Chemistry and Mineralogy at the Royal Academy of Construction, which positions he held until his death on June 28, 1838.

The foregoing note is based mainly upon a publication by Mr. Charles Albert Brown, of the United States Department of Agriculture.

Featuring Coke at a Trades Exhibition

This photograph is of the Birmingham Gas Department's Coke Stand at the Trades Exhibition which is being held at Bingley Hall, Birmingham. The " Eagle " coke grate with gas poker on exhibit is set on a raised hearth a foot above the stand level. The colours of the rays on the fascia are black and gold, and the floor covering is inlaid linoleum of black and colour representing flame. All the cards shown are in black and gold, and the striking appearance of the stand as a whole has attracted a great deal of attention from the large crowds visiting the exhibition. Samples of coke, graded into sizes for various purposes by the Gas Department, are shown in front of the stand. From a business point of view, the results have so far been very satisfactory. A large number of orders for coke have been obtained from new customers, and many orders and inquiries for coke fires.

DISPLACEMENT OF ELECTRICITY BY GAS

An Up-To-Date Lighting Installation by Gas at a Motor Garage

THE ECCLESBOURNE GARAGE LIGHTED BY GAS.

At the Ecclesbourne Motor Garage which is situated in Green Lanes, Palmers Green, on the main road to Enfield, in the area served by the Tottenham and District Gas Company, there has recently been introduced an excellent installation of low-pressure high-power gas lamps which, as indicated by the accompanying photograph, produces an exceedingly fine illumination.

Electric lighting was previously in use at the garage, the units being 500-watt lamps used for interior and exterior lighting, the cost of which, so we are informed, represented an outlay of over £200 per annum. The owners of the garage were anxious to reduce their lighting costs and at the same time to increase, if possible, the illumination, particularly as they were not over-satisfied with the existing arrangement; and judging from the large number of very efficient low and high pressure gas lamps installed in Palmers Green district, it was thought that the potentialities of gas for their purpose might be advantageous.

The Gas Company's representative learned of this interest, approached the owners, and obtained permission to submit particulars of a gas lighting scheme for the illumination of the carriageway, entrance, and the island petrol pumps. There was some competition in the matter, as the electricity undertaking had an opportunity of quoting, but as the result of examination of the figures the owners of the garage decided to adopt gas.

The Tottenham Undertaking accordingly installed eight low-pressure Sugg "Rochester" lamps with parabolic reflectors on the exterior of the building, placed in such a way as to throw the flux of lighting on to the pumps. Interior lighting has been done by three 1000-c.p. "Rochester" lamps suspended from the roof trusses spaced equi-distant and controlled by distant control valves fixed on one control switchboard. The exterior lamps are likewise controlled. Electricity was previously used in the garage itself.

The two entrances are served by 14-ft. columns with swan-neck brackets and 1000-c.p. lamps with parabolic reflectors controlled by clockwork mechanism. These illuminate the petrol sign boards which are erected on 12-ft. standards.

The hourly consumption amounts to 275 c.ft., and the saving to the proprietors is estimated to be in the neighbourhood of 60 p.ct. of the previous lighting bill. Needless to say, the owners of the garage are highly delighted with the result, and the appearance at night is excellent.

IN CONTINENTAL COUNTRIES - - -

Abstract Translations from the Technical Press of France and Germany

CONSTRUCTION OF TARRED ROADS.

"Das Gas- und Wasserfach," 1931, 74, 281-289, contains, together with the ensuing discussion, a paper by Herr Müller dealing with modern principles of road construction.

German specifications for road tar are reproduced. These are of interest in that they specify, for the various grades, upper limits of 2 p.ct. and 3 p.ct. by volume for tar acids, 4 p.ct., 3 p.ct., and 2 p.ct. by weight for naphthalene, and 3 p.ct., 3½ p.ct., and 4 p.ct. by weight for crude anthracene. English specifications do not contain a clause relating to anthracene. A "free carbon" content of at least 5 p.ct. is required for all the grades and none may contain more than 18 p.ct. of "free carbon." As regards specific gravity, there is only an upper limit, whereas British specifications fix a lower limit also.

A résumé is given of methods for applying the tar and chippings, with information as to quantities required, first costs, and maintenance costs. The best form of stone chippings is stone or blast furnace slag of size $\frac{1}{2}$ in. to $\frac{5}{8}$ in.

In Germany, both by tonnage and as a percentage of the tar produced, the use of tar for road purposes is much less than in Great Britain or France. In view of the excellence of tar as road material, propaganda is advocated with a slogan of "German tar for German roads," with a view to competing against the use of bitumen.

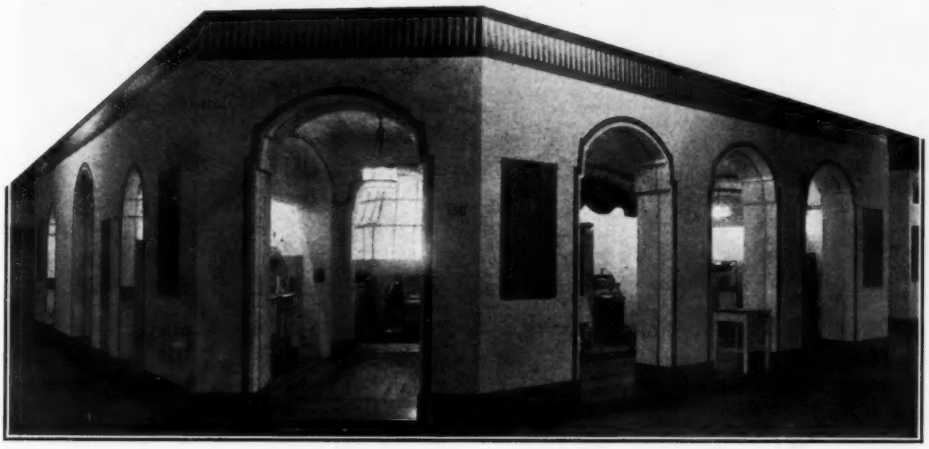
In the discussion, Dr. Hassel described a tar distillation plant working on the pipe-still principle, and applicable to the distillation of quantities of tar not less than 5 tons per day for production of a No. 1 road tar. The crude tar is pumped through a system of three heat interchangers, in two of which it is heated by circulating oil which has absorbed the latent heat of condensation of the vapours condensed in the columns, and in the third by the hot road tar. It then passes to an evaporator in which water and a portion of the light oils are removed, these being condensed in a water-cooled condenser coil. The tar is next pumped through the coil of the pipe-still in which it is heated to approximately 270° C., and thence to an expansion chamber in which the hot road tar separates out, the vapours being fractionally condensed in two columns giving heavy oil, middle oil, and a further quantity of light oil. Each column is supplied with a tubular dephlegmating section around the tubes of which oil (wash-oil) is circulated by help of a pump and an auxiliary overhead tank, the heat taken up by the oil being absorbed by the crude tar in the first two heat interchangers.

Balance-sheets are given for a 5 ton per day plant working 70 and 140 24-hour days per year. The total cost including erection is approximately £1000. Depreciation, capital charges, and maintenance are reckoned at 19 p.ct., and one operator per shift is required. With tar at 45s. per ton, and road tar at 80s. per ton, the annual profit works out at £366 (70 days per year) and £927 (140 days per year). The balance-sheet is, however, open to some criticism.

"DAILY MAIL" IDEAL HOME EXHIBITION

Packed with features of a new and original kind to appeal to every taste, this Exhibition is claimed to embrace the most comprehensive and varied selection of homecraft, housing, furnishing, and decoration displays ever presented to the public at Olympia

[April 7—May 2, 1931]



THE LONDON GAS EXHIBIT.

The most up-to-date and attractive home ideas are represented in nearly 600 exhibits, which comprise furnishing and music, decoration and sanitation, heating and lighting, refrigeration, housing, building and other sundries, domestic appliances, food and cookery, &c. In such an exhibition, gas can rightly play an imposing part, and it is a pleasure to find that it does so.

THE LONDON GAS EXHIBIT.

The Committee entrusted with the combined exhibit of the seven London Gas Companies have once more taken a broad view of their responsibilities, and have staged a display well worthy of the great industry to which they belong. The members of the Committee and the undertakings represented are as follows: Sir Francis Goodenough (Gas Light and Coke Company), Chairman, Mr. A. Stokes (representing the South Metropolitan Gas Company), Mr. W. J. Sandeman (Croydon Gas Company), Mr. W. Wastell (South Suburban Gas Company), Mr. C. M. Croft (Wandsworth and District Gas Company), Mr. F. J. Bradfield (Commercial Gas Company), Mr. S. Chandler (Tottenham and District Gas Company), and Mr. A. Nicol (London Coke Committee), with Mr. E. J. Henwood as Hon. Secretary.

The stand, which is to the design of Mr. Walter Tapper, A.R.A., F.R.I.B.A., and has been constructed by the Gas Light and Coke Company, may be described as being in the form of a Maltese cross. Each of four avenues leads up to a central feature built in " Staybright " steel and surmounted by glass, behind which is the brilliant illumination afforded by a large number of incandescent burners. The four fires—Cannon " Carnation," Richmond " Marlborough," " Metro," and Wright " Vandyke "—are all of stainless steel finish. The effect is impressive, and the note of brightness which the arrangement strikes remains with one throughout the inspection. There is nothing dull here, nothing to dim the suggestion that gas, besides being a reliable friend, can be the pleasantest of companions. The four avenues already referred to are devoted to the display of coke boilers and cookers of various sizes, together with gas fires and open coke fires. There is also a model bathroom equipped with different types of instantaneous and storage water heaters.

Of the four sides of the stand, one is a small office for the use of the attendant-in-charge, while another is reserved for demonstrations of ironing and laundry work by labour-saving gas heated washers, &c. Yet another is utilized for featuring various appliances provided with flexible tubing fitted with patent " plug-in " connections, and there is a series of artistic lighting fittings, and an illustration of the conversion of an old type pendant to a modern one at small cost. There are switches to all lighting points. Portable reflector heaters are shown, with various styles of radiators. While the " St. Bernard " and Cannon " Belle " type are on view, there are also the Main " Romain " wall pattern and Parkinson " Indusa " heaters. To a central heating gas boiler are connected four " Ray-rad " radiators, fixed flush on the walls of the exhibit at various points; and there is a Davis safety garage radiator. Gas irons, gas curling tongs, gas heated lace irons, and all those small but useful aids which add so much to the comfort and leisure of the lady of the house are to be seen.

Water heaters for the lavatory basin with spray for shampoo assist in demonstrating the never-ending usefulness of gas in the home, doctor's or dentist's surgery, and office or factory. In the four exterior recesses there are shown a Potterton 921 complete apparatus, insulated, with snap-action thermostat; a Richmonds " Equator " boiler, finished in ivory; a Ruud water heater, in ivory; a Ewart " Califont " copper bronze, on porcelain enamelled stand; a Fletcher Kingsway " New World " cooker; a " Metro " cooker; a Parkinson " Suburbia " cooker; and a Cannon " Challenge " cooker. All the cookers are finished in mottled enamel.

The Committee have organized two competitions—one a crossword puzzle, the other a competition to estimate the make of gas by the Companies comprising the exhibit for the two weeks ending at midnight on May 2 next. Both are calculated to emphasize the importance of gas in every home, and incidentally they will confer upon some fortunate individuals substantial prizes in cash and gas appliances.

Visitors, when they inspect the display of the London Gas Exhibit Committee will certainly wonder why it has been considered necessary for a Minister of the Crown to stump the country and urge the adoption of electricity, when people can get more reliable service at a lower cost for all their needs and comfort by using gas—a well-tried " friend " of the public, which has an enviable record of unfailing service (through periods of war, strikes, and peace) of some 120 years. There is no doubt the Committee have done much to uphold the dignity of gas, and also to add to the attractiveness of the Ideal Home Exhibition. As showing the completeness of their work, one useful little piece of propaganda may be mentioned in closing—that is, the presentation to each visitor of a convenient sized wallet containing two booklets and other germane literature.

The Committee have also installed gas for the heating, cooking, and water heating of a model house erected by the " Woman's Journal " and a model bachelor girl's flat.

In the house furnished and decorated under the direction of the " Woman's Journal," all the rooms are fitted

ARTISTIC LIGHTING FITTINGS IN THE LONDON GAS EXHIBIT.

with gas fires, and there are, in addition, other labour-saving gas appliances. The kitchen equipment includes a "Eureka New World" gas cooker, a "Ruud" water heater, and a National Radiator Company's central heating boiler of 45,000 B.Th.U. per hour capacity. The various living-rooms and bedrooms have different designs of gas fires in attractive finishes, including the "Panella" fire in armour bright finish, "Cinderella," "Marlborough," and "Metro," while on the landing is a convector "Ray-rad."

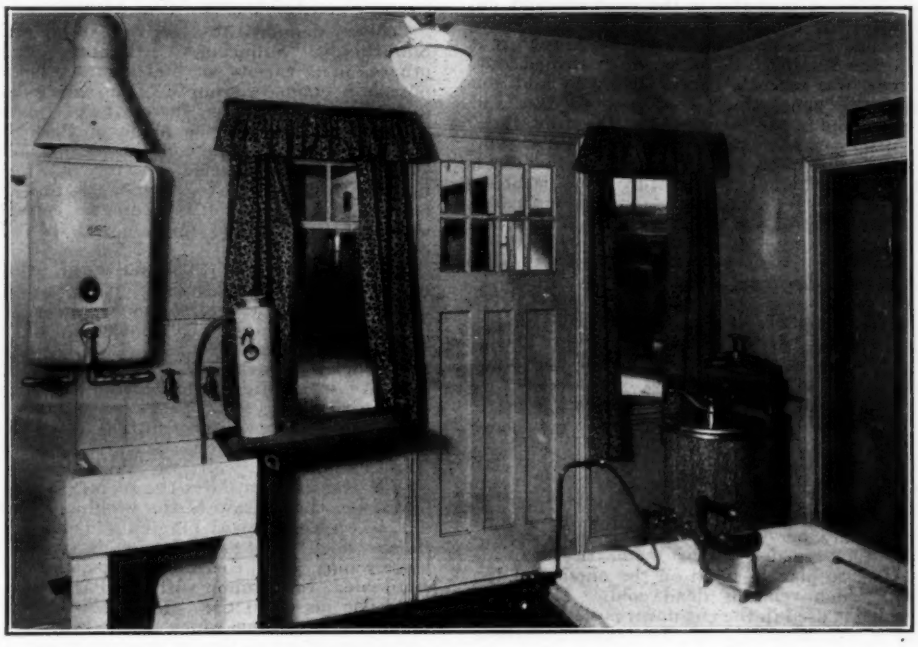
There are also some gas appliances installed in the United Women's Homes Association house, including a Davis "Antony" fire and a Fletcher "Desmond" fire in black finishes, together with a Richmond "Bungalow" gas cooker in mottled enamel in the kitchen.

GAS IN THE "SUNLIT" HOUSE.

The regular visitor to the "Ideal Home" Exhibition at Olympia—and no doubt we are all regular visitors to so popular a display—cannot leave without taking with him, or her, the vivid impression that gas can still hold its own, both from the point of view of utility and decorative effect, in every modern home. There is no doubt that the A.M.A. "Sunlit" House, which is equipped by the South Metropolitan Gas Company with a complete gas service for lighting, heating, cooking, water heating, and refrigerating, emphasizes this point in a definite manner. Modern gas practice has reached such a high state of efficiency that a repetition of the various useful functions performed is unnecessary, but in this house there are some new applications, or modifications of applications, which deserve special mention.

The now well-known log-fire welcomes one on entering the lounge hall, and a pleasing note is struck by a modern standard lamp. This lamp is specially distinguished by its severity of design, which includes a tall silica chimney. It is a fitting that has evoked a considerable amount of comment. It may be assumed that, generally, a room is built or furnished round the fireplace, and certainly the fireplaces in this house (which are provided by Messrs. Flavels, of Leamington) are a centre of attraction, and display the gas fires in admirable settings. The "Metro" food warmer, standing, as it does, next the service hatch in the dining-room, fulfils a very useful purpose. It is heated by a small gas burner, and admirably performs its function, which is to keep (say) an entrée dish with eggs and bacon nice and hot, or the coffee pot steaming. The late riser may thus be encouraged to adopt it as an adjunct to his gas service.

THIS METHOD OF LIGHTING A ROOM BY BRACKETS AND STANDARD LAMP FITTED WITH A SILICA CHIMNEY IS SEEN IN THE "SUNLIT" HOUSE, EQUIPPED BY THE SOUTH METROPOLITAN GAS COMPANY.



THE ALL-GAS KITCHEN IN THE "SUNLIT" HOUSE, SHOWING THE "METRO" MULTI-POINT WATER HEATER.

A supply of hot water is readily furnished by means of a "Metro" multi-point water heater fixed in the kitchen, which serves sink, lavatory basin, and bathroom; and the needs of the household where small quantities of hot water at varying temperatures are required—as for shampooing and rinsing—are met by the installation of a "Metro" storage heater in the bathroom. This heater, and the whole of the bathroom in fact, presents a most pleasing appearance.

The health of the household is safeguarded by means of the convenient gas operated refrigerator. The cooker, finished with enamel and fitted with pilot light, is something more than a mere means of cooking; the enamelled panels being decorated with Dutch scenes, so as to meet the desire for something which is attractive as well as useful. Washing day ceases to be a bugbear in this house. Not only is there a washing machine finished in enamel, which washes clothes really clean, but there is also a drying cabinet, enabling clothes to be dried indoors during inclement weather, and a "Metro" iron which helps the housewife to complete her task rapidly. All the lighting fittings are operated by distance control units, both the "Newbridge" and the pneumatic switches being shown.

One comes away from the house with the conviction that gas can, with taste and discrimination, be artistically adapted to any scheme of domestic decoration. There is a plentiful supply of literature—not to be taken up and thrown away upon departure, as is so often the case, but to be placed in a special attractively designed envelope, supplied to each visitor who may desire one.

On the house itself a word of praise should be bestowed, for it is well planned and as well executed by the "A.M.A." Portable and Permanent Building Works, High Road, Laindon, Essex.

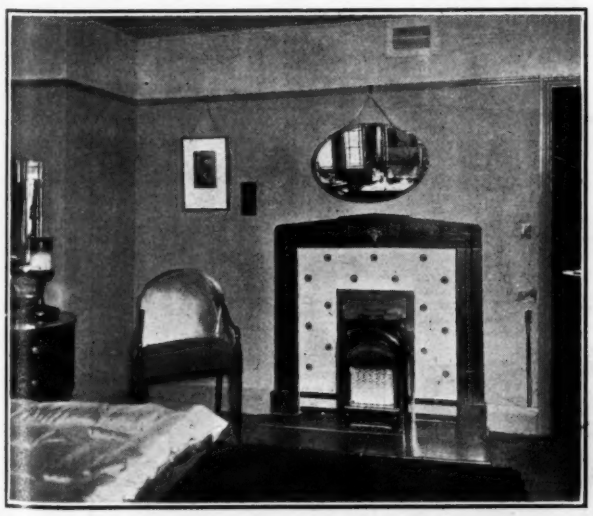
A SURVEY OF THE EXHIBITS.

Radiation Limited.

Radiation Limited are again making a feature of their "New World" porcelain enamel gas cookers and ranges fitted with "Regulo" control.

Special cookery demonstrations are being given at the Stand No. 135, Empire Hall, every day. An interesting feature of these demonstrations is that a whole six-course dinner is cooked entirely without attention. To make the point quite clear to the public, the oven itself is securely fastened against interference, and is not opened until the set time for the cooking of the whole dinner. This is a fine advertisement for automatic gas cooking, and brings home, in a striking way, the reliability of the "Regulo," in the construction of which such great care is taken by the Radiation manufacturers.

The basic features of the single burner and direct bottom-flue-outlet, incorporated in the "New World" cooker when it was produced eight years ago, have remained standard, and the experience of Radiation Limited has



"A Metro" Gas Fire with an Artistic Setting in the "Sunlit" House.

Modern Lighting and Heating by Gas in the "Sunlit" House.

strengthened their belief that this is the most efficient design, in every way, for general domestic cooking. Quite apart from the considerable economy in gas, there is a great improvement in the quality of the cooking turned out. The oven, however, was recently deepened by the addition of a low-temperature zone which enables both fast and slow cooking to be done in the same oven at the same time. In other words, dishes such as milk puddings, custards, &c., requiring a lower temperature can be placed in this zone, while roasting or other higher temperature work is being done on the shelves above. This development has made the simultaneous cooking of a whole six-course dinner not only possible, but quite simple to perform. The Radiation demonstrators, at their cookery exhibitions in different parts of the country, invariably include this as an item in their programme.

The porcelain enamel finish of these cookers and ranges is all that could be desired, and has done a very great deal to turn public attention to the possibility of introducing a really modern tone to their kitchens, and the avoidance of a very considerable amount of labour for cleaning, &c.

Thermal Storage Gas Water Heaters.

These also have a prominent place on the stand, examples of Richmond's "Equator" and Wright's "Sunhot" boilers being shown actually in operation. Public interest is considerably heightened by their being asked, first, to feel the temperature of the water that can be drawn off, and then to place a hand on the outside of the storage cylinder, which remains dead cold. The small amount of gas which is used in the cut-down position (under 2 c.ft. per hour) is also pointed out. The exhibit of these storage heaters, which will be seen by thousands of people every day passing through the exhibition, is bound to have a stimulating effect on inquiries from the public.

Richmond's "Equator" boiler gives an ample hot water service at bath, wash-hand basin, and scullery sink, at short notice and a low cost. With the full-on gas supply of 55 c.ft. per hour, adequate supplies of hot water for domestic use can be drawn off at any tap within 10 minutes of lighting up, and a hot bath in 40 minutes from cold. Any number of hot baths can follow at 40-minute intervals. The cut-down consumption is under 2 c.ft. per hour.

With the Wright's "Sunhot," the maximum consumption is only 10 c.ft. per hour, and this again is cut down by the automatic "Regulo" control to under 2 c.ft. when the water is hot. This consumption of gas is sufficient to keep an ordinary household well supplied with hot water for all purposes. So well insulated is the "Sunhot" boiler that this small consumption will suffice to keep the water at 140° Fahr. ready for use. Only when hot water is drawn off is the gas automatically raised to its maximum of 10 c.ft., and this only until 140° Fahr. is again reached by the water.

The fitting of the "Sunhot" is a very simple matter, as the small gas consumption does not necessitate any alteration to the existing gas meter or piping and, generally, there is no necessity for the flue—also a big advantage.

The Davis "Shamrock" geyser is also shown in operation, and will make a strong appeal to that section of the public that prefers the older and instantaneous method of obtaining hot water. "Shamrock" geysers are supplied in several very beautiful finishes, which, in addition to being permanent, make cleaning a very easy matter.

A selection of Radiation standard gas fires with "injector-ventilator" and with the new "Beam" radiants is also shown on the stand.

Parkinson Stove Company, Ltd.

Cookers demonstrated on this stand include the "New Suburbia," "Suburbia," "Holborn," "Liverpool," and others, in a variety of mottled and beautiful self-colour porcelain enamelled finishes, and are sufficiently pleasing in appearance to satisfy the most exacting housewife. Particular mention may be made of the "New Suburbia," with its one-burner bottom-flue oven, the burner (at the side) being easily accessible for lighting. This cooker, fitted with the "Ajusto" regulator, for oven heat control, is specially adapted for automatic cooking. It is most economical in gas consumption and its enamelled surfaces ensure easy cleaning.

The Parkinson oven heat indicator, which can be fitted to these cookers, is a visible guide to oven temperature, and is shown on several of the cookers displayed.

Many fine examples of Parkinson's "Hygienic" gas fire, in sheathed metal, bronze, art silver, and other finishes, are on view. Parkinson fires are fitted with "Sunray" radiants, which give great heating efficiency. Due to their design, resulting from years of research, these radiants give a cheerful healthy warmth akin to the heat of the sun.

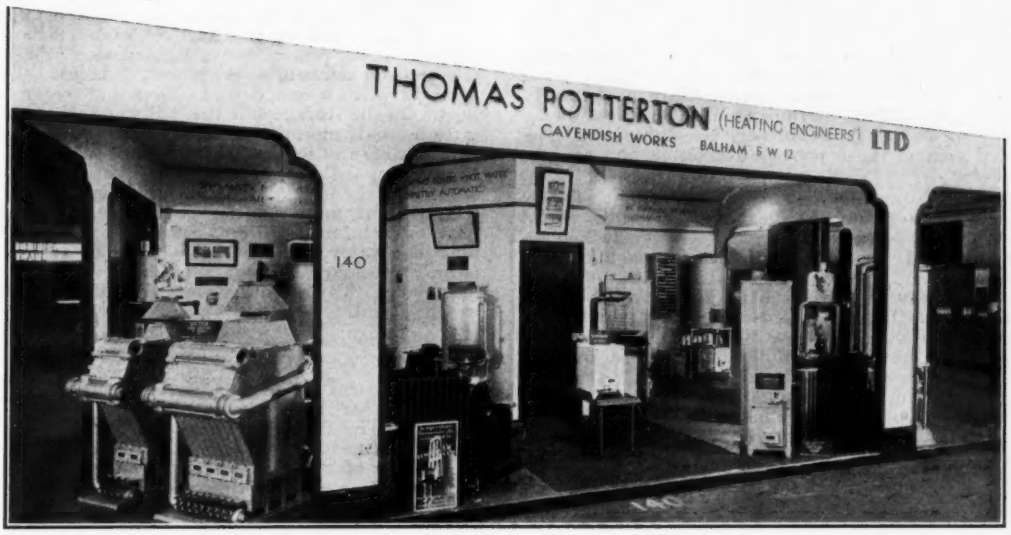
In the heating section a feature of special interest is the "Indusa" heater, which, in addition to its heating properties, effectively ventilates the room. Air is drawn in at the base from the outside of the building, approximately 1000 c.ft. of air per hour at 145° Fahr. being circulated through the heater. These heaters are particularly adaptable for large rooms, halls, corridors, shops, &c., where a flue is not available. In common with the Parkinson luminous radiator (also on view) the "Indusa" heater is fitted with a luminous panel door which gives a pleasant cheerful glow.

An important section of the exhibit is devoted to water heating apparatus, including Parkinson-Maughan geysers. The following types are on view: "Treasure," "Teba," "Simplice," and "Pearl," in a variety of attractive finishes.

The Parkinson "Hot Spring" storage water heater is a neat cylindrical self-contained apparatus entirely automatic in operation. Owing to the very low consumption of gas necessary to ensure a continuous supply of hot water, it is remarkably economical in use. This storage heater has a capacity of 20 gallons and operates in conjunction with the ordinary domestic water supply, hot water being always available. The normal gas consumption is from 10 to 12 c.ft. per hour, which is automatically cut down to 1½ to 2 c.ft. per hour when the water reaches the predetermined temperature. A feature of this storage heater is the safety pilot, which automatically cuts off the gas supply in the event of the flame being accidentally extinguished. An ingenious capacity gauge (provisionally protected) which indicates accurately the amount of hot water in the container can also be fitted.

Thomas Potterton (Heating Engineers), Ltd.

This firm are making a special feature this year of gas-heated thermal storage hot water supply equipment, both for flats and small household requirements as well as for larger residences, business premises, and other trade purposes. The new "Empire" and "Emperor" gas boilers are prominent features. These are two standardized units for attachment to cylindrical and rectangular hot water storage vessels, providing the utmost flexibility of adjustment for the purpose of operating towel rails, airing coils, &c. They are fitted with the new patent bi-metal thermostat and luminous burner, and are capable of regulation to a low by-pass consumption of 2 c.ft. per hour for the main-



tenance of heat in a lagged set such as obtains in a small flat and other building where there is no secondary circulation required to distant taps.

For larger purposes, however, where the bathroom is situated some distance away, and a linen coil has to be operated for airing purposes in a cupboard, these boilers have the flexibility of adjustment to burn 3, 4, or more c.ft. per hour in proportion to the heat losses imposed by the flow and return circulations involved. Such secondary circulations should be efficiently covered to reduce the heat emission to the lowest possible limit, otherwise thermal storage conditions and consequent economy cannot be obtained.

The " Emperor " gas boiler, which is similar to the " Empire " but insulated and enamelled, is of special finish and suitable for the most exacting housewife, while the " Emperor " thermal storage apparatus, which is of similar finish throughout, fulfils the utmost demand in this respect.

As an example of a thermal storage hot water supply installation for small houses, bungalows, flats, &c., Messrs. Potterton have a working system comprising an " Emperor " No. 1 thermal storage apparatus operating a heated towel rail and supply to sink, which demonstrates the suitability of gas for such purposes. Constant hot water supply is available under the most economical conditions, a consumption of 2½ c.ft. per hour being sufficient to maintain the water in the system hot, allowing for the additional output of heat from the towel rail and the short secondary circulation that is required therefor.

On the heating side, a separate installation of central heating is in use, showing the convenience and efficiency of gas-fired boilers for the purpose. The system comprises a No. 19 " D " series " Victor " boiler with rod thermostat for automatic control, operating two radiators on outside corners of the stand, in conjunction with one of which is incorporated a magnetic valve affording an example of individual room control of the most efficient type. The " D " series " Victor " boilers can be very efficiently employed for central heating up to 500 sq. ft. of radiation, being installed either singly or in twin or triplicate form according to the demand. For larger installations the " R " series boilers are available, and have a full range of capacities up to 252,000 B.Th.U., above which they can be installed in twin or triplicate form in proportion to the requirements. These boilers are shown in two sizes, fully equipped with enamelled jackets, adjustable thermostats, flue bafflers, and pressure governors.

A useful combination of gas and coke apparatus is on view, comprising a " Domestikatum " boiler and a No. 193 " Victor " set, which meets the demand of warming the kitchen or servants' sitting-room during the winter months, by the action of the open-fire boiler grate. A larger example of combined apparatus is available in the display of low-pressure hot water heating and " indirect " hot water supply apparatus operated from a coke boiler having a specially constructed indirect cylinder, to which is applied a " Victor " boiler for summer duty, when the presence of a coke fire is undesirable and likewise out of proportion to the requirements. For larger plants for central heating, sectional boilers and radiators are exhibited in various forms.

Gas as a Labour Saving Fuel.

A large number of other firms, well-known in the Industry as manufacturers of all kinds of domestic gas appliances, are exhibiting at Olympia, and every stand undoubtedly sets forth the various appliances to excellent advantage, showing gas as the labour-saving fuel for the home. Among these exhibitors, the following stands are of note:

Messrs. Anti-Waste Appliances, Ltd., of Oxford Circus, are showing their various designs of gas cookers on their stand, finished in white vitreous enamel, brown porcelain enamel, and nickel plate. The construction of these cookers is of cast-iron and mild steel with angle-iron frame. The burner dials are of interest, indicating " off," " full," and " low " positions; at the " low " position it is impossible to turn out the gas. The hotplate is of cast-iron brown porcelain, and waste heat is diverted under the hotplate where it becomes useful heat. The ovens are claimed to heat up in about three minutes owing to the rigid but light construction. After heating up, the gas is turned to the " low " position, and this gives a definite oven heat. All parts of these cookers are easily removable for cleaning purposes. The firm are also showing baking ovens, gas rings, &c., in addition to the Lambert " White Tile " water heaters, which are supplied in instantaneous and storage types.

On Messrs. Clarkhills, Ltd., stand is an entirely new automatic water heater, working under ordinary conditions, and shown to the public for the first time. With this apparatus, an unlimited supply of hot water can be obtained at a moment's notice for sink and bathroom use. Except when the water is actually being drawn off, only a by-pass is burning, the heater being entirely automatic. This " Clarkhill Minor," as it is called, has a gas consumption while water is being drawn off of 3 c.ft. per minute of 500 B.Th.U. gas. The output of the apparatus is three gallons per minute raised 40° or correspondingly smaller flow with higher rise in temperature. It can be installed to supply the whole house all the year round, or can, if desired, be fitted to work as an alternative to an existing boiler or circulating system. Other types of water heaters are being exhibited by the firm, all in attractive chromium finishes.

In the refrigeration section of the Exhibition, Messrs. Electrolux, Ltd., are showing, among others, types of their gas-operated refrigerators, the chief features of which, of course, are that they work without a single mechanical moving part and entirely without noise or vibration.

As usual, Messrs. Ewart & Son, Ltd., of Euston Road, have a comprehensive display of their well-known water heating apparatus. The firm's geysers are designed to supply all hot water requirements for the home, the " Califont " and " Vivo " types being of particular note, supplying, as they do, all points in the house, if desired, immediately upon turning on the tap. Ewart's " Agate " and " Alcove " bathroom suites in colour are extremely attractive, fulfilling the modern demand for brighter bathrooms.

A New Cooker.

A complete section of Messrs. Falk, Stadelmann's stand is devoted exclusively to gas apparatus, making a very

attractive exhibit. A new gas cooker—the " Newhome "—is on view, having a very conveniently sized oven, with ample capacity for the needs of the average family. The cooker being raised on legs to lessen stooping, as an aid to cleanliness the floor can easily be kept clean beneath. The hotplate of this cooker has a patent reversible grilling burner, and the boiling burners supplied are particularly powerful for quick boiling, and have raised jets to allow an ample supply of secondary air for perfect combustion. The grey mottled enamel finish is very attractive and easy to keep clean.

On the water heating side, this firm are showing their new " Spa " water heater and storage boiler, which is useful when small quantities of hot water are constantly and instantly required. It is made of copper throughout, the water-ways being heavily coated with pure tin, in order that the water can safely be utilized for drinking or culinary purposes. Highly finished in white metal, it is durable and of a very pleasing appearance. A special adaptation of this heater is manufactured for use by dentists or in hairdressing establishments. The " Veritas " geyser is also shown, which is claimed to be remarkably efficient, giving a bath of 25 gallons of hot water in ten minutes. The internal construction of this geyser is of entirely new design, embodying an improved method of ventilation, resulting in complete combustion and a minimum of heat loss.

" Silo " gas fires are much in evidence on this stand, in a variety of attractive finishes, while the " New Century " patent lighter is shown attached to one model. The new " Silo " radiant is also shown. (Both the " New Century " lighter and the radiants have been described fully in the " JOURNAL.") Other apparatus on the stand include gas rings, irons, and pokers, the latter now being made in a flat shape instead of round, this having been found more advantageous, particularly for insertion through the bars of domestic coke boilers. Various lighting fittings on view are very attractive, a new design of tap for pendants being particularly interesting. This does away with the somewhat ungainly chains which of necessity have to hang down on either side of the fittings and often cause the whole bowl to sway when pulled, and in their place is merely an unostentatious little tap, which resembles an ornamentation projecting from the bottom of the bowl or fitting. This type of tap can be adapted to a wall panel light also.

The " Metro " coke fire is to be seen in many types and designs on the stand of Messrs. Sidney Flavel & Co., Ltd.; in a variety of attractive surrounds. The " Metro Log " gas fire is a particularly pleasing apparatus giving the appearance of a log fire, though actually burning only gas. Flavel cookers of various types were in evidence, a feature of these being that all wearing parts may be removed for cleaning, while a number of attractive decorative finishes have been introduced.

The " Hurry " Water Heater Company are showing their " Hurro " hot water circulators, which are small machines that can be attached to any ordinary hot water circulating system in order to heat the water by gas when the coal fire is not in use. These circulators are also utilized for radiators and industrial purposes. An interesting exhibit is the " Hurry " dual purpose gas-heated copper, which provides hot water on the overflow system for baths or for washing clothes.

" IDEAL " BOILERS.

The National Radiator Company are showing a model of their " Ideal " gas boiler for water heating and indirect hot water supply. This is a highly efficient appliance (made in a number of sizes), with an insulated jacket enamelled in light grey; all the platework and the draught diverter being enamelled black. The boiler is fitted with gas control valve and thermostat, complete with copper connections. There is also a gas governor. The control cock is marked off in degrees, and any temperature can be obtained from about 90° to 210°. The boiler operates on the principle of the permanent leak valve, there being no pilot light, the actual flames cutting down to half an inch when the required heat is attained.

This firm are also showing a number of their " Ideal " domestic coke boilers, an innovation being the production of these for the first time in attractive coloured finishes of green or brown. The well-known " Cookanheat " is also in evidence, a feature of which is the ability to open the front to obtain a large, unobstructed open fire, the change from the closed position being quickly effected. The firm also supply radiators of various descriptions, and the " Ideal Rayrad " for radiant warming of rooms.

An interesting stand from the water heating point of view is that of Messrs. New Geysers, Ltd., of Addington Square, S.E. 5. Here storage heaters and geysers of all descriptions are to be seen, particular importance being attached to the new and very attractive finish of the " White Chief " apparatus, in white porcelain enamel. This apparatus consists of a closed type geyser of high efficiency, with a separate outer case of heavy welded steel, the whole being mounted on the firm's new patent " Access " base (sliding pattern), with a new design of gas and water interlocking taps. On the storage side the " Instor " heater provides an instant and unlimited supply. It is a combined instantaneous and storage heater, which will supply hot water to any tap within one minute of lighting, or will provide ample storage for the same purpose available for use at any tap without manipulation of the heater. Another apparatus of interest is the " Storot " water heater for complete hot water service in the home. To set in operation it is only necessary to light two small jets, after which it is automatic. Various other smaller heaters are also on view at this stand.

COLOURED GEYSERS.

On the stand of the Pollard Engineering Company, Ltd., are a number of the firm's geysers in attractive coloured finishes. The Pollard circulator is a new apparatus shown, which is of neat appearance and occupies very little space. It consists of a boiler heated by an efficient atmospheric burner, with a consumption of only 30 c.ft. of gas per hour. The standard model will maintain a constant supply of hot water in a 30-gallon cylinder. The shell of this boiler is solid drawn from one piece of high-grade steel tested to a pressure of 100 lbs. per sq. in. A scientific arrangement of thermal ducts presents the large heating surface of 572 sq. in.

The Wonder Washer Co., Ltd., of Luton, are showing various examples of their well-known product. The No. 909 model gas operated washer is a new apparatus exhibited, being an all-metal machine in mottled enamel finish, with heavy gauge copper tinned container and chromium plated fittings. It is stated that the Wonder Washer washes everything from blankets to fragile silk garments without injury, and will do one week's washing for a family of six persons in about an hour, without rubbing or rinsing with the hands, and consuming not more than 3d. worth of gas and little more than half a bar of soap.

A number of other firms are showing gas or coke apparatus of various types, including Messrs. Easiwork, Ltd., who manufacture gas cookers in various attractive finishes to harmonize with their complete coloured kitchen equipment. The " Easiwork " low-pressure cooker cooks a complete meal at one time. These cookers are fitted with a self-lighting attachment. The " Cookall " one-burner gas cooker is being exhibited on the stand of the British Sa-Vall Company, of Bedford Street, Strand, W.C. 2, which cooks without exposing the food to the gas or fumes. The feature of this appliance is the fact that there is only one burner, the surplus heat being used for boiling.

Gas cookers and small heaters are in evidence on the stand of the Economic Household Appliance Company, Ltd., of South Hackney, the chief exhibit being the " Ekonomic " gas kitchener, all models of which are heated entirely by a single gas burner. This is arranged with asbestos fuel in such a way that it provides adequately the heat necessary for the stove to carry out its numerous functions. It has two ovens, enabling joint and pastry to be cooked at the same time. Examples of " Ekonomic " gas radiators were also shown.

The Eagle Range and Grate Company are showing their combination grates, introducing a new " low oven " model shown for the first time in London. Alternative gas-or-coke and gas-or-coal fires are to be seen on the stand of Messrs. C.C. Fires, Ltd., of Mark Lane, E.C. 3. All types of " C.C." fires are easily fitted to existing fireplaces by patent adjustable stool grates—made for either coke or coal. The open fires may be gas ignited. Various models in attractive finishes all afford the convenience of gas fires for early morning and occasional use, while retaining the open fire for longer periods. A gas-ignited barless coke fire, embodying the same patent adjustable stool grate, but without the gas fire section, is also shown on this stand.

" Sentry " boilers are shown in various sizes to suit any house on the stand of Messrs. Wood, Russell, & Co., Ltd., of Oxford Street, W. 1. " Sentry " boilers and ovens are shown in plain bright, with white enamel panels, and also in attractive grey mottled enamel finishes.

The exhibit of Messrs. A. Bell & Co., Ltd., of Kingswell Works, Northampton, consists of a fine range of new designs of " Bell " tile and brick fireplaces shown in a variation of beautiful Delft colours, and fitted with various types of " Bell " fires. Several designs are fitted with the new " Bell " patent faience and tile built-in and inset gas fires, while " Bell " canopy dog grates were to be seen in various finishes.

THE "JOURNAL" TECHNICAL RECORD

Which also contains Full Reports of Meetings of Gas and Allied Associations ———

North British Association of Gas Managers

Presidential Address of Mr. H. G. Ritchie, A.M.I.Mech.E., M.Inst.Gas E.

The Spring Meeting of the North British Association of Gas Managers was held in Falkirk, on Friday, April 10. The meeting was favoured with delightful weather, and the attendance was a record one. Mr. H. G. Ritchie, of Falkirk, the President of the Association, was in the chair.

A Civic Welcome.

Provost W. Smith, of Falkirk, said it gave him and his colleagues of the local Town Council great pleasure to be with the members of the Association and to accord them a civic reception. In appointing Mr. Ritchie as President for the current year the members had not only conferred a deserved honour on the Gas Manager of Falkirk, but they had likewise paid a compliment to the community of Falkirk. Their President was a most valued municipal servant, and he (the speaker) could assure the members that Mr. Ritchie had done wonderful work in Falkirk during his tenure of office there. During the ten years he had been in charge of the works everything had gone smoothly.

The President, on behalf of the members, thanked Provost Smith for the cordiality of his reception, and expressed pleasure that other members and officials of the Town Council had found it convenient to be present.

Obituary.

The President announced that since the last meeting of the Association the following members had died:

Ordinary Members: Messrs. John Livingstone, Tillicoultry; Alexander Waddell, Edinburgh; Thomas O'Neil, Dunbar; Henry Gourlay, Markinch.

Life Members: Messrs. Alexander Scott, Aberdeen; Peter B. Watson, Glasgow.

Extraordinary Members: Messrs. John Walker, Ayr; John G. Alcott, Huddersfield.

Presentation of Certificates.

The President thereafter presented Certificates of the Institution of Gas Engineers to the following successful candidates: Frank G. Symon, Glasgow (First-Class Certificate in Gas Engineering); Alexander C. Rea, Edinburgh (First Class in Gas Engineering); Thomas M. Duncan, Perth (First Class in Gas Engineering); Wm. Nicol Baird, Edinburgh (First Class in Gas Engineering and Gas Supply); James Storrier, Dundee (Second Class in Gas Engineering); Wm. Stewart Johnstone, Dundee (Gas Engineering); Kenneth E. Graham, Glasgow (Second Class in Gas Engineering); Wm. Ramage, Dunfermline (Second Class in Gas Engineering).

PRESIDENTIAL ADDRESS

of Mr. H. G. Ritchie, of Falkirk.

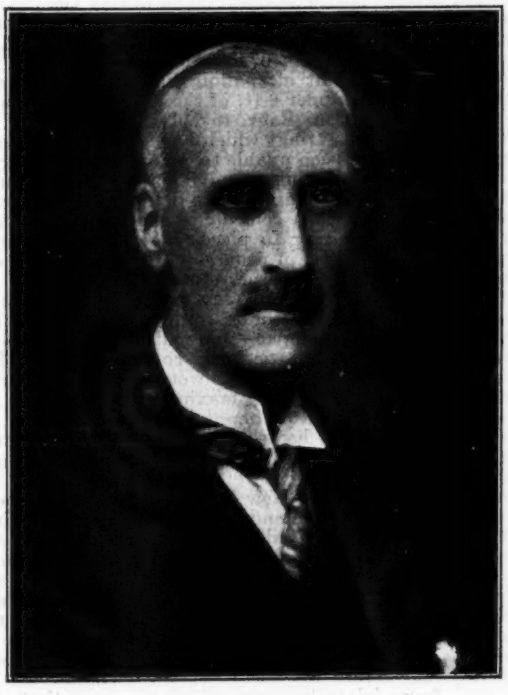
I would like to put on record my appreciation of the honour conferred on me by appointing me President of this Association, which is now in the 70th year of its existence.

It is difficult to find a new subject for a Presidential Address, and I intend to speak mainly on the Undertaking of which I am in charge.

Manufacturing Plant.

As most of you know, our entire manufacturing plant consists of five ovens of 8 retorts each of Glover-West vertical retorts. These retorts were built in what was a coal store, at the end of a horizontal retort bench. The foundation had to be piled within the existing building. The piles, of which there are 77, are of the cast-in-place type, and are from 40 to 50 ft. in length. They are surmounted by a ferro-concrete raft. During the construction of the verticals, the old conveyor supplying coal to the horizontal bench was hung from the roof, and had to be kept running over the site. One half of the roof had to be left in position, the other half being cut away to allow the coal bunkers to go through, the existing roof then being bolted to the new structure, and the whole made good. The old coal conveyor had to be kept running until the structure of the vertical retort bench was sufficiently advanced to complete the gravity bucket conveyor. The retorts are the 21 ft. long straight type, which was the Glover-West standard at the time they were erected.

Piling started during April, 1920, and gas-making started in October, 1921. The financing of the scheme may be in-



THE PRESIDENT.

H. G. Ritchie, A.M.I.Mech.E., Engineer and Manager to the Falkirk Gas Department.

Mr. Ritchie was educated at Kirkcaldy High School and the Heriot-Watt College, Edinburgh. He is a Heriot-Watt Medallist in Gas Engineering. Trained at the Kirkcaldy Gas-Works, he was appointed Engineer, Manager, and Secretary to the Fraserburgh Gas Company in 1908, whence he went as Engineer and Manager to the Irvine Gas Company in 1912, where he remained until early in 1920. During the time he was at Irvine the works were practically reconstructed. On leaving Irvine Mr. Ritchie was appointed Engineer and Manager to the Falkirk Corporation Gas Department.

teresting. A suspense account was started by transferring £15,440 from the reserve fund at May 15, 1921. The total cost was £65,661, and the balance of £50,221 was paid out of revenue during the succeeding years and the total paid off at May 15 last. For income-tax purposes, Falkirk decided to accept the allowance for renewals as and when they occur, instead of the allowance for depreciation, and that helped us during this period, whether the allowance for renewals is an advantage over a period of years is open to question. The Surveyor of Taxes accepted an estimate at prices ruling when the replacement occurred, for an installation of horizontal retorts of similar capacity and equipment to the one being dismantled, less the net amount recovered for scrap and second-hand material as the rebate for income-tax.

No. 1 oven was built with "Bluebell" silica bricks, and were the first vertical retorts to be built of that material. The other four ovens were of firebrick, and, after being in use for an average of 1162 days, they gave way between the combustion chamber floor tiles, and got so far out of the straight that trouble began to be experienced by the charge hanging. One side of No. 4 oven was in use 1521 days and the other 1074 only, owing to the floor tiles being dislodged. All retorts were pointed after 800 days' use, that being the only time they were let down. No. 3 oven was under fire for 1252 to 1194 days, No. 2 from 1181 to 1115 days, and in the case of No. 5 both sides were in use for 978 days. I had, by the time this occurred, had sufficient experience of "Bluebell" silica retorts in No. 1 oven to justify me in recommending the adoption of that material when re-setting the others. No. 1 oven had been working for 1890 days up to Nov. 15, 1930 (our records are made up to this date every year, and final decisions made as to what repairs are to be undertaken during the next summer). After slight repairs I expect it to do duty until the summer of 1932. The retorts are still quite straight. The first 2 ft. from the top is of firebricks, and also 2 ft. at the bottom. The amount of spalling has been slight, and it only occurs in the upper 9 ft. of the retort, where the temperature is from 2350° Fahr. to 2500° Fahr. Nos. 1 and 2 are the only silica settings which have been let down; consequently we have been unable to examine the other retorts thoroughly. The spalling we have noticed occurs when the retorts are off for scurfing, due no doubt to the contraction which takes place when cold air is allowed to pass up the retort. Silica adhering to pieces of carbon is sometimes found when scurfing is in progress; all the carbon accumulates in the upper 9 ft. of the retort.

If we could conveniently lay off four retorts at the same time for scurfing—that is, one side of an oven controlled by the main damper—this spalling could be practically eliminated, as then the heats could be reduced before scurfing is started; but to do so would reduce the throughput, when working at our maximum, by 14 p.ct., and when working at our minimum period, by 25 p.ct., and allowing for lowering heats, scurfing, and bringing retorts back to working temperature, six days would be required. To get over this difficulty, we scurf as many retorts as we can, four at a time, at New Year holidays when the output is low; towards the end of February before letting an oven down the same is done, and so on as such opportunities offer. Some further research is necessary on the jointing material used with silica retorts, as it is only at the joints that we have had leakage. We are using a cement gun for hot patching, and I have found it to be a useful and satisfactory tool. In No. 4 oven, especially, we have had considerable worry with joints after scurfing, and we patched one retort by means of the cement-gun in 63 places. Some joints had opened up so much that it was found advantageous to mix pieces of broken silica with the cement.

Thick Division Wall.

It is difficult to give the expansion and contraction accurately, as some expansion took place when re-setting the oven was in progress, owing to heat coming from adjoining settings which were gas-making at the time. For that reason, I would suggest to vertical retort contractors that the division walls between the ovens should be at least 18 in. thick, exclusive of linings. The total expansion on the 20 ft. 6 in. retort can be taken at 3 ft. when first heated, the lateral expansion was not measured, but would be proportionate. Care must be taken if fireclay retorts are being replaced by silica, as when we were doing so the contractors did not allow sufficient for lateral expansion, and it pushed out the top 5 ft. of the back wall.

The following is a record of the vertical expansion on re-heating our No. 1 (original silica) oven which had been pointed and slightly repaired by our own men, due to the lack of shield tiles in the combustion chamber. This oven had already been in use for 1885 days, when a small fire was put in the producer on Oct. 7 last, and gradually brought up until gaseous firing was commenced on Nov. 5. The retorts are numbered from the producer, odd numbers on one side and even numbers on the other. No expansion took place until Oct. 30.

	October		November									
	30.	31.	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.
Retort No. 1	½	½	⅝	⅝	1⅛	1⅜	1⅝	2	2½	2½	2½	2½
,, ,, 2	½	½	⅝	⅝	1⅛	1⅜	1⅝	2	2½	2½	2½	2½
,, ,, 3	..	..	½	⅝	1⅛	1½	2	2½	2½	2½	2½	2½
,, ,, 4	..	..	⅝	⅞	1	1⅜	1⅝	2	2½	2½	2½	2½
,, ,, 5	..	..	½	⅝	⅞	1⅛	1⅜	2	2½	2½	2½	2½
,, ,, 6	..	..	½	⅝	⅞	1⅛	1⅜	2	2½	2½	2½	2½
,, ,, 7	..	..	½	⅝	⅝	⅞	1	2	2½	2½	2½	2½
,, ,, 8	..	..	½	½	½	⅞	1	2	2½	2½	2½	2½

The expansion begins when there is no visible sign of heat; consequently great care has to be exercised when heating up.

The original producers, which have a grate area of 1100 sq. in., were found to be rather small and were re-designed, and are being reconstructed as opportunity occurs, the grate area now being 1760 sq. in. The larger producer gives a better gas, as shown by the analysis:

Reconstructed Producer.

	Time after Clinkering.			
	½ Hour.	1½ Hours.	2½ Hours.	3½ Hours.
	P.Ct.	P.Ct.	P.Ct.	P.Ct.
CO_2	11·8	8·9	9·9	10·0
O_2	0·3	0·5	0·4	Trace
CO	16·3	20·6	18·0	18·4

Original Producer.

CO_2	14·2	13·1	14·0	15·7
O_2	Trace	0·3	0·3	0·1
CO	13·0	15·6	14·6	12·5

Before clinkering a producer it is filled up with coke in order to ensure as little dust as possible being carried forward to the flues; of course, it is refilled when clinkering is finished. This plan was adopted when we found out that on occasion the fuel was down below the arch after clinker and ashes had been removed. It was originally considered the producers would not require live steam, but we found they did clinker without it. Coke to producers is kept of a constant quality. A sufficient number of retorts are always charged with the same kind of nuts, and the coke from these is taken to hoppers supplying producers. Coke is screened by allowing it to pass over bars in the outlet chute, where the runway is filled.

The back wall of the installation has been lined with a 2-in. coating of an 85 p.ct. magnesia compound to prevent loss of heat. The material is kept in position by means of wire netting, as is usually done. The heats are now easier to maintain, especially during strong easterly winds, and the coke consumption per 100 lbs. coal carbonized has been slightly reduced.

Working Results.

The working results over the last completed year are as follows: The calorific value stated is that ascertained by the Gas Examiner appointed under the Gas Regulation Act. Our own figure, which is the average of two tests taken daily, except Saturday and Sunday, when one only is taken, is practically the same:

Gas per ton of coal carbonized	19,488 c.ft.
,, ,, ,, ,,	84·05 therms
Average calorific value	431·3 B.Th.U.
Coke sold per ton of coal carbonized	6·11 cwt.
Tar made ,, ,,	19·7 gallons
Sulphate made ,, ,,	28·47 lbs.

The coke sold per ton is low, but when considering this figure consideration must be given to the quantity of steam to be raised in different works. In our case we have a compressor, steam hoist, and sulphate plant at work, over and above the ordinary gas-works plant.

Our standard C.V. is 430.

An analysis of gas, the C.V. of which, as tested by the calorimeter, was 431·9 B.Th.U., gave the following analysis:

	P.Ct.
CO_2	3·6
O_2	0·5
C_nH_m	1·9
CO	21·0
H_2	47·8
CH_4	15·2
N_2	10·2

An analysis of the gas when it reached 446·9 B.Th.U. (calorimeter test) may be of interest, viz.:

	P.Ct.
CO_2	3·9
O_2	0·5
C_nHm	1·8
CO	21·3
H_2	48·4
CH_4	16·2
N_2	7·9

A mixed sample taken proportionately to the quantities of the different coal used, has the following analysis:

	P.Ct.
Moisture	3·37
Volatile matter	31·25
Fixed carbon	60·55
Ash	4·83

Condensers.

There is nothing of particular interest in our purification plant, but it may interest some of the younger members to know that what were put down as temporary condensers when an explosion occurred in a set of water-cooled condensers shortly after the works were erected in 1905, are still in use; a water spray only has been added. It consists of an out-and-in run of 10-in. cast-iron pipes running alongside Forth and Clyde Canal. The slower method of cooling the gas gave considerable relief from naphthalene complaints. The pipes rested on cradles on concrete blocks, but to allow for movement due to contraction and expansion they now rest on rollers, which should prevent drawn joints. This is a more convenient method than inserting expansion joints.

Gasholders.

I consider the regular examination of gasholders important. Both our holders have their tanks above ground. The subsoil all over the site is very unsatisfactory for foundation; consequently the tanks were put down without disturbing the subsoil. Had it been excavated trouble would have been met with. The tanks are very little out of the level. Slight leakage of water from the tank of column-guided gasholder was repaired last summer. These leakages were mainly at the angle iron carrying platform at top of the tank. The water-level was reduced by about 5½ ft.—in other words, ½ million gallons of water were run off. Defective rivets were removed and bolts substituted, and defective joints caulked. A thorough examination of the condition of the inside of tank plates was made and practically no pitting was found. Although a stream runs alongside this tank, the water from it was not used to refill the tank, the town's water supply being preferred. The guide wheels of this holder are regularly examined and lubricated, and this also applies to the guide rollers on our spiral guided holder.

Boilers.

We have three boilers, two small Babcock's which have been at work since 1905, and a larger one put down in 1912. When the compressor was fixed in 1927, we were faced with a shortage of power, as previously, with the three boilers steaming, we had nothing to spare when the sulphate of ammonia plant was working. I decided to put a Crosswaite furnace on the larger boiler, and that has saved putting in larger boilers. Our output of breeze is entirely used in the boilers, and we buy in any surplus they have at neighbouring works.

Cost of Running Motor Lorry.

We have been running a 30-cwt. end-tipping motor lorry during the past 6½ years. It is used for delivering coke to customers in our own area, carrying main and service layers and the material they require to the different jobs every morning, also bringing old meters, cookers, &c., back to the works. As there is no mileage recorder on the lorry, I cannot give the number of miles run, but it is running continuously 47 hours weekly over these short runs. The average running costs per annum over 6½ years are:

	£
Tax	24
Repairs, including replacement of tyres	68
Petrol and oil	90
Driver's wages	175

A new machine is on order now, and the old one is to be kept for service inside the works, no licence being required then.

Distribution.

Lead service pipes were favoured here at one time. Owing to sagging, and being too small for present-day requirements, these are being re-laid with wrought-iron tubes. To prevent internal corrosion of service pipes, for the past eight years I have been using wrought-iron tubes galvanized inside and outside. All tubes contracted for are to be to the specification of the Institution of Gas Engineers. Eight years is not a long period of trial, but on examining some of those longest in use, I feel satisfied that the results will justify the small additional cost for galvanizing. We had a most unusual experience with one of those old lead service pipes. The gas and water services were laid side by side in a tenement, and a leakage of water impinging on the gas service wasted the latter away until it was holed. The water got into the gas service, and so ran back to the main, which was eventually almost cut off. The water leakage was not discovered owing to its finding its way into a drain and also into our service pipe.

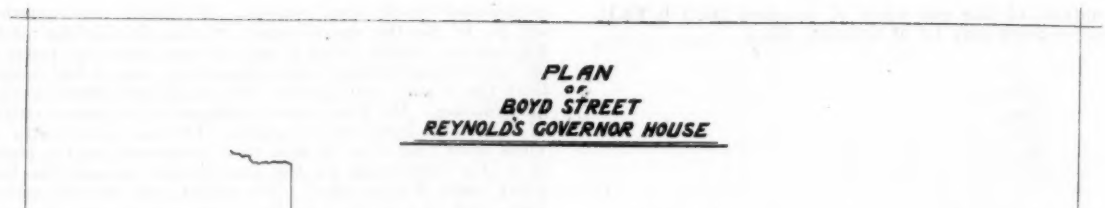
During the past three years we have scrapped 1628 two-light meters. We use none of that size, of course, now. Should a two-light meter be fitted in a confined space where a No. 2 meter could not be substituted, we fix a 50-c.ft. high-capacity meter. I believe the scrapping of the two-light meters has helped to reduce the unaccounted-for gas. We do our own meter repairs. Should a gas undertaking be able to keep a meter repairer constantly employed it assuredly pays. We have 12,175 meters in use.

Owing to the development of the use of gas, the pressure on the Camelon and Larbert part of our area gave us some thought during 1926, as it was getting very near the Gas Regulation Act minimum of 2 in. in a 2-in. main or over, which is certainly a low enough minimum if consumers are to have satisfaction. A 24 hours' record of pressure was taken at selected points all over our area of supply for several years and recorded, both during the summer and at the peak of the winter load. When, from these records, the decline in pressure in these districts was discovered, it was decided to put down a compressor and boost the low-pressure mains rather than lay larger mains. The compressor supply is taken from the column-guided holder. To prevent oscillation in the low-pressure mains when the compressor is working, the fixing of an anti-fluctuator or a valve to isolate the holder outlets was considered, and the latter method adopted as being absolutely certain in action. Gas can be drawn from the one holder to the other by the inlet pipes. As we have no duplicate compressor, I consider it advisable to have it overhauled by the makers during our summer holiday week every year, as at that time it is not so much required. The outlet from the compressor is a 10-in., reduced to 8-in., thereafter to 6-in. welded steel tube, with a 4-in. branch boosting the Camelon trunk main through a Reynolds governor. The 6-in. is carried on to another Reynolds governor and connected into our Larbert district low-pressure main. The Camelon governor is 1248 yards from the works, and that of Larbert 2851 yards away. There are 10-in. and 8-in. low-pressure trunk mains supplying Camelon, which are connected together at a point 997 yards from the governor outlet. I decided to start by boosting into the 10-in. main, which was cut out and a 10-in. by 4-in. angle branch fitted, to test if the gas would go forward to Camelon district. I found the pressure came back to the Falkirk district; in fact, it came right back to the works governor. I then had a similar branch fitted to the 8-in. and also a Bryan-Donkin by-pass valve, but although the gas was forced forward for further 997 yards to the junction of the two mains, we still found the gas travelled back to the Falkirk mains, a distance of 2245 yards, via the 10-in. pipe. In order thoroughly to test the working of this valve, we carried on in this way for a considerable time. We now have these by-pass valves fitted in both mains, and so far have had no trouble with them—the valve shutting and opening as the compressor is started or shut down.

The 6-in. high-pressure steel main leading to the Larbert Reynolds governor has to cross the Forth and Clyde Canal. The track was scooped out during the time the canal was being used, and on two successive Sundays the section was run off and the pipes laid. On either side of the canal a breeches piece was fitted and the pipe carried in duplicate through the bed of the canal, a valve being fitted on each pipe on either side. A water trap is fitted on each in the centre of the canal. To empty the traps, a hand hole was cut in the main and a blank flange fitted and clamped to the main. A brass nipple is fixed to the flange, a heavy service coupling is screwed to the nipple, and a length of light lead pipe jointed to the coupling tail by means of a plumber's joint, the lead pipe being carried inside the steel tube down to the water trap in the bed of canal. The usual malleable tube is fitted to the other end of the brass nipple for pumping out the condensate.

Survey of Consumers' Appliances.

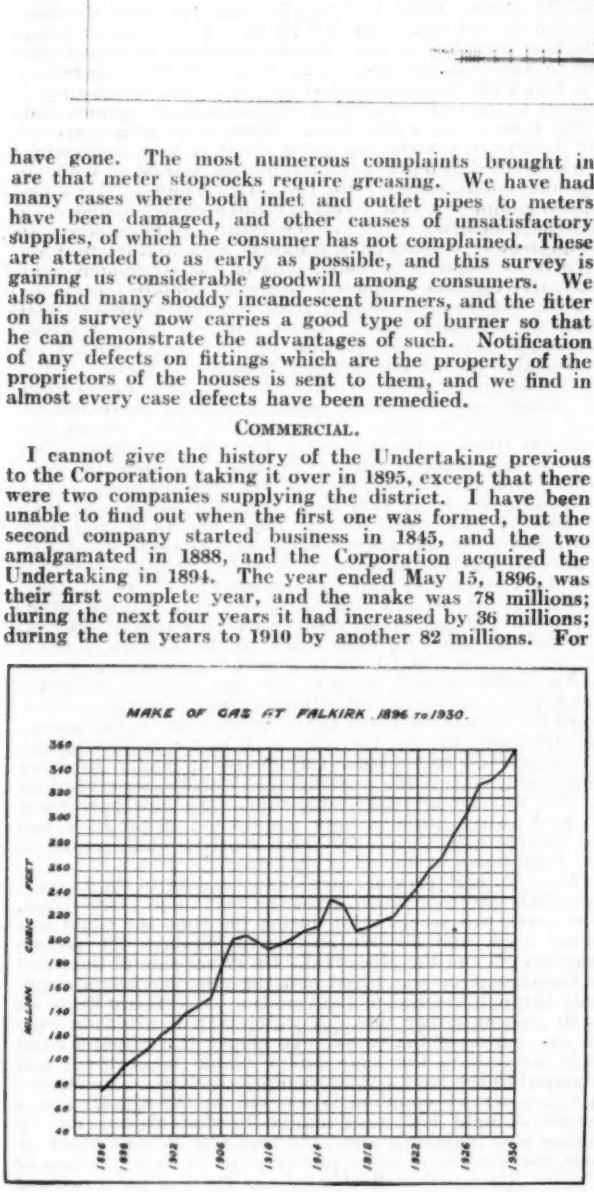
The Falkirk Gas Committee adopted the recommendation of the Departmental Committee of the Board of Trade that gas undertakings voluntarily make a survey of all the gas-consuming appliances in consumers' premises. We have discovered nothing of a serious nature so far as we



have gone. The most numerous complaints brought in are that meter stopcocks require greasing. We have had many cases where both inlet and outlet pipes to meters have been damaged, and other causes of unsatisfactory supplies, of which the consumer has not complained. These are attended to as early as possible, and this survey is gaining us considerable goodwill among consumers. We also find many shoddy incandescent burners, and the fitter on his survey now carries a good type of burner so that he can demonstrate the advantages of such. Notification of any defects on fittings which are the property of the proprietors of the houses is sent to them, and we find in almost every case defects have been remedied.

COMMERCIAL.

I cannot give the history of the Undertaking previous to the Corporation taking it over in 1895, except that there were two companies supplying the district. I have been unable to find out when the first one was formed, but the second company started business in 1845, and the two amalgamated in 1888, and the Corporation acquired the Undertaking in 1894. The year ended May 15, 1896, was their first complete year, and the make was 78 millions; during the next four years it had increased by 36 millions; during the ten years to 1910 by another 82 millions. For



the following ten years to 1920 the increase was 27 millions, and during the past ten years 136 millions, the make for last year being 360 million c.ft.

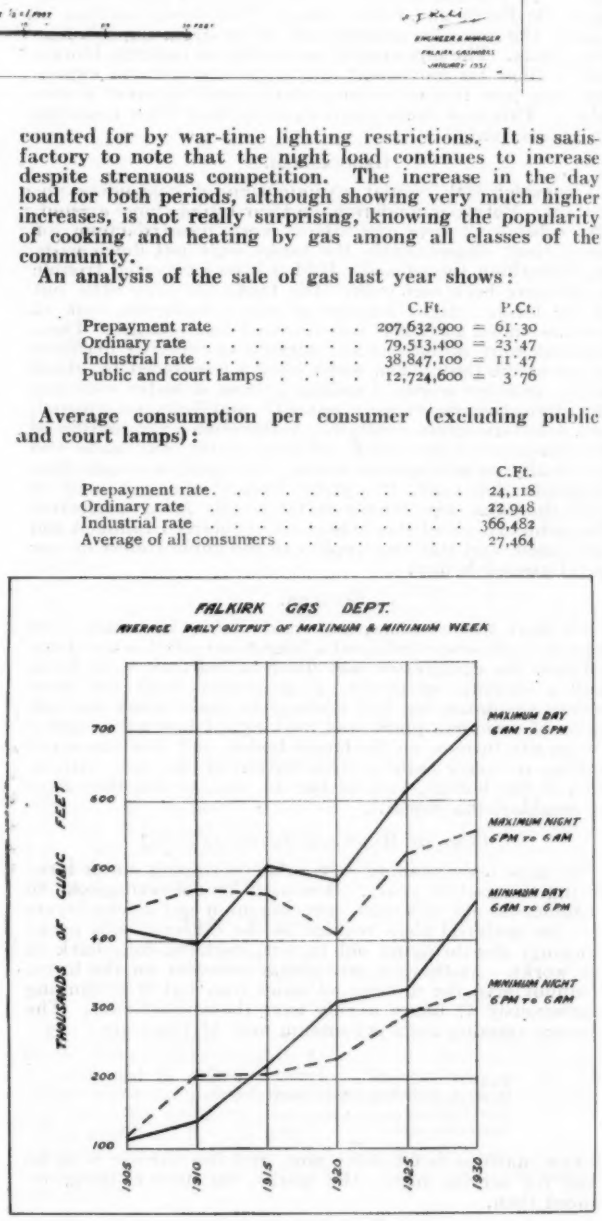
I have taken out figures showing the average day and night outputs for the maximum and minimum weeks from 1905 to 1930, a chart of which is shown. The figures are for periods of five years. The decrease between 1915 and 1920 in the maximum night load especially can be accounted for by war-time lighting restrictions. It is satisfactory to note that the night load continues to increase despite strenuous competition. The increase in the day load for both periods, although showing very much higher increases, is not really surprising, knowing the popularity of cooking and heating by gas among all classes of the community.

An analysis of the sale of gas last year shows:

	C.Ft.	P.Ct.
Prepayment rate	207,632,900	= 61·30
Ordinary rate	79,513,400	= 23·47
Industrial rate	38,847,100	= 11·47
Public and court lamps	12,724,600	= 3·76

Average consumption per consumer (excluding public and court lamps):

	C.Ft.
Prepayment rate	24,118
Ordinary rate	22,948
Industrial rate	366,482
Average of all consumers	27,464



Falkirk is a supporter of the British Commercial Gas Association, and we use a fair quantity of their publications, make use of the lorry poster service, and run the Fairy Gas Competition, in which children attending the schools in our area have been very successful. We ad-

vertise on a film in one of the local cinema houses; up to last season we had an advertisement on a Saturday evening concert programme, and we also occasionally advertise in the Local Press. I consider our showroom the best advertisement we have. We have only had one for the last seven years, and it is admittedly small and not in keeping with the size of the Gas Undertaking.

Falkirk started free loan cookers in the year 1911, and we still continue it for cookers up to the value of £3 10s. Range plates, oven squares, and boiling rings are also on free loan, and maintained free. We even supply flexible tubes for replacement free. All our tubes have the words "Falkirk Gas" embossed on the rubber push-on, and no tubes are now given for replacements unless the old tubes have our special push-on when returned. We give out high-grade all-enamelled cookers on a five years' hire-purchase scheme, and mottled enamelled cookers, such as the No. 76 "Mainservor," "Primula," and "Smoothtop," on simple hire rates. We have alternative rates for these. Should the consumer use over 40,000 c.ft. per annum the rate is 11s., but if the consumption is under that quantity the hire rate is increased to 16s. per annum. This was done to prevent having unremunerative simple hire cookers.

Are all free loans cookers remunerative? I think not. I have come to the conclusion that some reform in our methods of charging for gas is necessary, whether it be a two-part tariff or a fixed minimum charge per annum, or a combination of both. The provision of free cookers complicates the fixing of the quantity to be used at the higher rate in the first part of the tariff, as it is only fair that it should be higher in the case of those consumers having free appliances. Gas fires, radiators, and water-heating appliances are all sold on hire-purchase terms.

Residuals.

Notwithstanding the trade depression ruling all over the country, our Industry continues to hold its own, and many towns show considerable increases in output, although our competitors have during recent years received very much publicity from successive Governments and from inspired articles in the women's columns in the Daily and Weekly Press. The markets for our residual products have not escaped the prevailing depression. Coke produced at coke ovens is entering more than formerly into competition with that produced at gas-works, but fortunately most of our customers find it unsuitable. Certain coke oven owners, having entered into contracts to supply definite quantities of gas, have to make coke whether there is a market for it or not. Low-temperature fuels do not make much progress. The plant installed by the Gas Light and Coke Company has not so far proved a commercial success.

The market for tar products in the future is not bright. The British Road Tar Association is doing useful work by advertising road tar, but the British Government could assist our Industry, and that without detriment to the roads being constructed under the Unemployment Grants Scheme, if they specified that British road tar must be used—as is done in the case of the German Government for their products—instead of recommending foreign materials as they do now. Mr. Arthur E. Collins, a Past-President of the Institution of Municipal and County Engineers, writing under date Nov. 1, 1930, after referring to the Gas Industry as using 18 million tons of coal per annum, and so assisting the coal industry, says:

> Tar is one of the principal bye-products of gas-works, and, on its sale at a fair price, depends to a considerable extent the price of gas to the consumer.
>
> Time and time again British tar of standard specification, as well as proprietary tar preparations, has been shown to be equal, if not superior, to all other forms of road dressing. These tars provide hard-wearing surfaces with good grip for motor traffic, and they are not expensive. Is it too much to ask, therefore, that good quality tar should be more generally used instead of materials of foreign origin?

In one district of Yorkshire it has been stated that a saving of £7650 in the 1929 estimates would have been made had tar been used in place of bitumen for surface-dressing their roads last season. Similar saving could no doubt be effected all over the kingdom, including Scotland, and it would be to the advantage of the Gas Industry if greater publicity to such facts could be given in the Daily Press, which is read by town councillors and ratepayers who do not see the Technical Press. On the other hand, the British Road Tar Association funds are limited, and, while I understand this matter has been receiving their close attention, the expense of advertising in the Daily Press is more than their present funds permit.

Another means of securing the best economic price for tar is the rationalization of the tar industry itself. A large step in this direction has already been taken by the formation of the Scottish Co-operative Tar Scheme, and, if the scheme were supported by all the gas tar producers in Scotland, there is no question that we should receive the full economic value of this residual product.

The market for sulphate of ammonia has been ruined by over-production of synthetic ammonia. It is most unfortunate that the price of sulphate is controlled by the same people who control the price of sulphuric acid. Gas undertakings must dispose of their output of ammoniacal liquor somehow, and the making of sulphate is the most convenient method. To-day we are paying 55s. per ton for acid, whereas in 1914 we were paying 28s. 6d.—an increase of 93 p.ct. Spent oxide of iron is one of the raw materials used for the manufacture of acid, although admittedly to a limited extent. The price gas undertakings now receive for that product is practically the same as they did in 1914. To-day many undertakings are losing money to get rid of their ammonia. The prospects for residuals in the immediate future are not bright, but we have weathered storms before and will do so again.

Discontinuance of Sinking Fund Contributions.

The Falkirk Corporation Gas Act of 1894 gave authority to the Gas Commissioners of that time to borrow £120,000 for gas purposes, repayable in fifty years, the sinking fund conditions being the setting apart of a sum of not less than 1 p.ct. on the amount borrowed to be applied, together with the accumulated interest thereof, in repayment of the loans raised. When any part of the sinking fund was utilized for that purpose the Gas Commissioners were obliged each year, until the whole of such borrowed moneys were paid off, to pay into the sinking fund a further sum equal to the interest which would have been payable on loans paid off. The stipulation that this further contribution was to be made each year until the loans were paid off should be specially noted, as the stock issued under the borrowing authority is redeemable at par in 1945.

The statutory contribution to sinking fund was increased in the Corporation's Act of 1910 to not less than 1½ p.ct. of the amount borrowed. £110,950 of 3 p.ct. stock was issued under the powers granted by the 1894 Act, and, at May 15, 1928, the position of the sinking fund set up for that stock was as follows:

	£	£
Amount of stock issued		110,950
Contributions from revenue to sinking fund	56,100	
Interest on stock redeemed	18,780	
Investment income	17,892	
	92,772	
Cost of stock redeemed out of sinking fund	39,415	
Nominal value of stock redeemed		48,102
Sinking fund on hand at May 15, 1928	53,357	
Stock unextinguished at May 15, 1928		£62,848

The yearly income of the sinking fund had by 1928 reached approximately £5000, made up of contributions from revenue (instalment of debt and interest on stock redeemed) £3000, and interest on investments £2000. The market value of the £62,848 stock unextinguished at May 15, 1928, was estimated as being approximately £46,000, while the sinking fund on hand amounted to £53,357.

Authority was asked from the Secretary of State for Scotland to discontinue after May 15, 1929, the contributions from revenue for instalment of debt and interest on stock redeemed, and as soon as the accumulations of income on the sinking fund investments brought that fund up to the par value of the outstanding stock, the investment income, no longer required for stock redemption purposes, should be credited to net revenue account. This position will be attained at May 15, 1931. The Secretary of State for Scotland agreed to the proposals, subject to the approval of the Burgh Auditor, which was obtained, so that, since May 15, 1929, the net revenue account has been relieved to the extent of £3000 per annum, and in another year's time will be further benefited by the revenue derived from sinking fund investment income, which will amount to at last £2200 yearly.

You will appreciate that a total reduction of £5200 in net revenue expenditure will have a very beneficial effect on the valuation of the Undertaking, which I estimate will ultimately save the Department £3000 yearly in local rates. The reduction in the gross profit also means a very large saving in income-tax. I have to acknowledge my indebtedness to Mr. Harley, the Burgh Chamberlain, for the figures he has given me relative to the discontinuance of sinking fund contributions.

In conclusion, gentlemen, we can safely say that our Industry has done wonderful work for mankind in the past. The present trade depression in the country is, we hope and believe, passing, and although we may not have maintained the large increases in our outputs this year that we have been accustomed to, if taken on a thermal basis,

it is larger than any of our competitors for light, heat, and power, and we are prepared for the future. Thanks to the Institution of Gas Engineers' Education Scheme, we have young men of no mean calibre coming on, and any of you who have had the privilege of attending a Junior Gas Association meeting know that they add enthusiasm to their efficiency.

Vote of Thanks.

Mr. T. W. Harper (Ayr) said it was his pleasure to move a vote of thanks to Mr. Ritchie for his Presidential Address. The President had given the members an excellent and practical description of his manufacturing plant. They were told that his vertical plant was erected over ten years ago, and during that period had been re-set with silica firebrick. This conversion from fireclay to silica was now considered to be standard practice. It was interesting to note that there had been more trouble with excessive expansion. This was a common experience with the earlier types of vertical retorts, but was to some extent disappearing, owing to the improved quality of materials which could now be had for retort construction work. There was also the other advantage that contractors were now in a position to design a plant with single unit retort or multiple unit to suit any particular size of works, having due regard to the maximum and minimum outputs of the particular locality in which the retorting plant was to be erected. Mr. Ritchie was to be congratulated upon the splendid results obtained from his plant. It spoke very well for the way in which the plant was controlled that after ten years' working Mr. Ritchie should be able to obtain a consistent yield of 19,400 c.ft. of gas per ton, equal to 84 therms. The President seemed somewhat disappointed with the amount of coke produced for sale, but a return of 6·11 cwt. was as much as could be expected considering the nature of the steam requirements. Perhaps the addition of a waste-heat boiler would be a distinct advantage. It would increase the output of saleable coke, and at the same time cut out the cost of coke breeze bought from neighbouring undertakings. The figures given of the gas analysis were well-nigh perfect, taking into account the high yield of gas obtained. The type of condensers in the Falkirk Works was rather unusual, but they were told that these were put down as a temporary structure to meet an urgent requirement. The fact that they had fulfilled all requirements had converted a temporary construction into a permanent fixture. Dealing with the question of distribution, Mr. Ritchie put his faith in galvanized wrought-iron tubing for services. He (Mr. Harper) agreed with that, provided the galvanizing of the tube was of good quality. Sometimes he had found galvanized tubes which were little better than scrap, and he noted that the President had very wisely adopted the specification laid down by the Institution of Gas Engineers. Discussing the question of putting apparatus on loan or simple hire, Mr. Ritchie asked: "Is such free-fitted apparatus remunerative?" There could be no question that in the past this system had been the means of boosting up gas sales to their present output, but whether the time was opportune for discontinuing this method of installing apparatus would be for the consideration of each individual undertaking. Speaking generally, they did not in Ayr fit apparatus on free loan or simple hire. They had succeeded with hire-purchase. It would be very difficult for gas undertakings to drop an established system of supplying gas apparatus on free loan or simple hire; and those engineers who were up against this difficult problem would be well advised to continue, provided, of course, that the amount of gas consumed gave an adequate return on the cost of the apparatus installed.

As to the financial side of the Falkirk undertaking, he (Mr. Harper) had been very much interested in the annual accounts. Falkirk Town Council, in 1895, became the local authority for gas supply, and the annual output of gas on that date was 79 millions, while the output for the year ended May, 1930, was 360 millions. The Local Authority had only been in possession of the undertaking for 35 years, but in that time the output of gas had increased by 460 p.ct. This was a record of steady progress, and it had played an important part in providing revenue to meet the increasing cost of capital charges brought about by the rapid increase in the output of gas. During the past 35 years the capital expenditure amounted to something like £128,500, and this sum might have been much less had it not been for the fact that the vertical retort plant was erected during a period when prices were at their peak. It reflected credit on the plant and the management responsible for its installation that during the first ten years the results obtained were equal to the total redemption of the capital cost. It was pleasing to note that during this period of capital expenditure the management of the Falkirk gas undertaking had been able to keep the burden of capital charges within reasonable limits. He found that in the year 1921 capital charges amounted to 11d. per 1000 c.ft., and the cost of rates and taxes was 14·83d. per 1000 c.ft. In 1930, the corresponding figures were 9·75d. and 8·85d. respectively.

Mr. A. S. Nisbet (Paisley), in seconding the vote of thanks, thought that Mr. Ritchie was to be heartily congratulated on the results he had achieved at Falkirk. The financial stability of the undertaking was to be envied and most managers present would wish they were in the same happy position as Mr. Ritchie.

The President acknowledged the vote, and thanked the members for their cordial reception of his address.

Nominations for Council.

The following were duly nominated for vacancies in the Council: Messrs. George Keillor, Greenock; James Jamieson, Edinburgh; James Dickson, Kirkintilloch; J. K. Frazer, Dalmarnock, Glasgow; A. Dow, Galashiels; and Peter M. Sim, Buckie.

MEMBERS ENTERTAINED AT LUNCHEON.

After the meeting the members of the Association were the guests at luncheon of the Provost, Magistrates, and Town Council of Falkirk. Provost W. Smith presided, and with him at the head of the table were Sir Arthur Duckham, G.B.E., K.C.B., Captain Kennard, R.N. (Convener of the Gas Committee of Falkirk Town Council), and Messrs. J. W. McLusky (Glasgow), George Keillor (Greenock), David Fulton (Helensburgh), J. W. Napier (Alloa), A. S. Nisbet (Paisley), and Archd. Kellock (Airdrie).

Mr. J. W. McLusky proposed "The Corporation of Falkirk." They all admired Falkirk, he said, as a very enterprising burgh, and it was a town that was in the very centre of the light castings industry. Gas engineers, of necessity, were interested in light castings; and if the Gas Industry was doing well, then it was certain that the firms around Falkirk who dealt with the manufacture of light castings would be having more orders. His own City of Glasgow had sent orders to Falkirk to the value of £75,000 during the last five years. He could assure them that the total would have been doubled if economic conditions had been better.

Provost Smith, with whose name the toast was coupled, remarked that the Gas Department had always been well managed, and never more successfully than under the direction of the present Manager, Mr. Ritchie. The Gas Industry up till now did not appear to have suffered from any undue interference on the part of Government Departments. The unification of small units was all to the good for the future of the Gas Industry; and development along these lines ought to be encouraged.

Captain Kennard followed with the sentiment of "The Gas Industry," which he associated with the name of Sir Arthur Duckham. The Falkirk Gas Department considered they were progressive. Sir Arthur Duckham, who was the President-Elect of the Federation of British Industries, was leaving for Canada on April 18: and the whole Gas Industry was proud of him.

Sir Arthur Duckham, in the course of his reply, said that in recent years he had had a good deal to do with the Gas Industry, and he knew of no industry which had a clearer or keener ideal. That ideal was to sell as cheap a product as possible, and to give as good a service as possible to the consumers. The Gas Industry had a bright future, but it was being handicapped in its dealings with the public. It was being handicapped by Parliament. Indeed, the only handicap it did not suffer from was that it had no State aid. He did not regret this, because State aid might have hurt the Industry more than anything else. It did not want State aid or State interference, but it did want that general freedom which was accorded to other industries in the country, and especially to their competing industry—electricity. They asked that the Gas Industry should be allowed to make charges for its product on the same bases as the electricity industry. Sir Arthur went on to say that he saw one of the "plums" of the Industry advertised in a Glasgow newspaper—a job involving immense responsibility. The salary offered was £800 per annum, which was equivalent to the salary of the manager of Woolworth's shop in Sutton. They must encourage the best brains to come into the Industry, and that could be done only by the payment of adequate remuneration. They were not frightened by the competition offered by electricity, but there was a surplus of oil at the present time, owing to the tremendous development of that product in America. In this connection the significant point to be remembered was that every ton of oil imported into this country to-day meant the equivalent of two men out of work in the coal industry. He was ready enough to agree that electrical competition had done the Gas Industry good, but he assumed that in certain spheres of that competition the Gas Industry must lose. In the power sphere electricity must win. In the lighting sphere, those who could afford the luxury of electric light would have it. In the heating sphere, on the other hand, gas would continue to hold its own so far as electricity was concerned. After all, that was the great service the Industry was rendering—giving cheap heat to the community. Oil, however, was being sold in London at a cheaper price per heat unit than coal. The competition of oil was shutting down the coal mines. He trusted that some pressure might be brought to bear on a needy Chancellor of the Exchequer who, undoubtedly, wished for new sources of revenue, so that they might tax the oil imported into this country and give further employment to the people of the land. In conclusion, Sir Arthur observed that the Gas

Department in Falkirk was a very good example of what they in the Gas Industry would like their undertakings to be.

Ex-Provost MUIRHEAD proposed "Our Guests," and Mr. GEORGE KEILLOR (Greenock) briefly replied.

Mr. DAVID FULTON (Helensburgh) called for a vote of thanks to the Corporation of Falkirk for the hospitality they had shown to the members of the Association, and to Provost Smith for presiding.

Provost SMITH, in acknowledging, said he had enjoyed the gathering very much.

VISIT TO THE GAS-WORKS.

Following the luncheon the members of the Association and the other guests present paid a visit of inspection to the Gas-Works at Falkirk, where they were entertained at tea.

GOLF COMPETITION.

The Golf Circle of the Association held a competition over the Falkirk Tryst Golf Course on Thursday, April 9. Thirty-six players took out cards, with the following result:

Scratch Prize.—George Keillor, Greenock, 83.
First Handicap.—D. D. Bruce, Thurso.
Second Handicap.—Allan Young, Edinburgh.
Third, Fourth, and Fifth Handicaps.—Tie between Peter Blackhall, Edinburgh; L. Gardner, Lenzie; and J. D. Whitelaw, Glasgow.
Sixth Handicap.—G. A. Mitchell, Glasgow.

Prizes presented by the Captain of the Golf Circle, Mr. J. Winson Scott, were won by Mr. R. L. Laing (Brechin), Mr. A. B. Bradley (London), and Mr. M. A. Waddell (South Queensferry).

Ideal conditions prevailed, and the close of a perfect day was the presentation of the prizes by Mr. Ritchie, the President of the Association.

London Juniors' Visit to Fulham Works

Last Saturday afternoon (April 11) the London and Southern District Junior Gas Association, under the presidency of Mr. T. H. Prater, of Margate, paid their last works visit of the present session—the venue on this occasion being the Fulham Gas-Works of the Gas Light and Coke Company. The visitors, numbering about sixty, were welcomed by Mr. A. H. Solomon, the Station Engineer.

DESCRIPTION OF WORKS.

The Fulham Gas-Works were described very fully, with a number of photographs, in the "JOURNAL" for July 28, 1926, on the occasion of the opening of the new coal handling plant and Glover-West vertical retort installation, which were set in operation by Lady Cunliffe-Lister, who was accompanied by Sir Philip Cunliffe-Lister (then President of the Board of Trade).

The Fulham Gas-Works were originally constructed in 1829, and were acquired by the Gas Light and Coke Company in 1876, through amalgamation with the Imperial Gas Company. These works are the second largest in the Company, and although now probably the oldest in London, are yet representative of the most up-to-date features of gas-works construction.

The works, which have a present gas-making capacity of 135,000 therms, or 27 million c.ft., of 500 B.Th.U. quality, a day, occupy an area of 30 acres on the north bank of the Thames, a short distance above Chelsea Railway Bridge. The Fulham Works now treats 1580 tons of coal a day, and, in order to reduce handling charges, the supply is brought to Fulham direct from Durham by the Company's colliers, of 1750 tons capacity, specially designed for this up-river work. To deal with these, a riverside wharf was constructed where two 10-ton cranes, with 5-ton capacity grabs, unload the vessels in six and a half hours into a reinforced concrete bunker holding 2000 tons. From this bunker the coal is transported nearly half a mile across the storage ground, by a system of rubber belt conveyors, at a rate of 250 tons per hour, to a central crushing station, fitted with Jeffrey single-roll crushers. Such coal as is not required for immediate use is discharged on to the storage ground *en route*, where it is stacked and later re-claimed for return to the belt by a large travelling crane at the rate of 150 tons per hour. The stock of coal maintained is usually 40,000 tons. From the crushers the coal is delivered into overhead bunkers in the retort houses, holding 30 to 48 hours' supply.

CARBONIZING PLANT.

At the Fulham Works there are four retort houses. Carbonization is carried out in Nos. 3 and 5 by the use of horizontal retorts of recent design, and in Nos. 1 and 4 houses by the continuous process in vertical retorts. The two horizontal retort houses, which are similar in construction, each contain 200 Ω-shaped retorts, 23 in. by 16 in. internal dimensions, and either 20 or 22 ft. long. In No. 5 house the retorts are fitted with anti-dips, and the pressures governed by "Askania" regulators. The combined capacity of these two houses is 510 tons of coal daily, from which they produce 37,150 therms, or 6,750,000 c.ft. of 550 B.Th.U. gas. Fiddes-Aldridge stoking machines, fitted with the new open-sided chain, first draw the coal automatically from overhead bunkers, and then in one operation expel the hot coke from the retorts and introduce a fresh charge of either 12 or 13¼ cwt. The period of carbonization varies from 10 to 12 hours. In the No. 1 vertical retort house there are 128 retorts of the Glover-West type, each 39 in. by 18½ in. at the base, tapering to 33 in. by 10 in. at the top, and 25 ft. long. The capacity of this installation is 420 tons of coal per day, giving a yield of 33,000 therms, or 6,500,000 c.ft., of 510 B.Th.U. gas. The retorts in this house are heated by sixteen producers arranged alongside the base of the bench and fired with cold coke.

No. 4 house contains 72 Woodall-Duckham vertical retorts, arranged in two benches. The retorts here are 26 ft. 6 in. long, tapering from 103 in. by 18 in. at the base to 103 in. by 10 in. at the top. The capacity of this plant is 646 tons of coal a day, representing an output of 51,000 therms, or 10 million c.ft., of 510 B.Th.U. gas. The producer gas for these retorts is obtained from two batteries, each of seven producers, and is delivered to the settings by a steel, firebrick-lined main, which is common to both benches.

Two out of the three plants are fitted with oil carburettors and superheaters. The three units, though not incorporating recently introduced devices—*e.g.*, self-clinkering generators, automatic operation, and the "back-run" process—are of standard design. The daily output of this plant is 4 million c.ft., of quality which can be varied between 300 and 520 B.Th.U. per c.ft.

At Fulham Works on leaving the manufacturing plant, the gas from each retort house, and from the water gas plant, passes through its own section of condensing, exhausting, and purifying apparatus. Finally each stream is separately metered and the quality determined by a recording Fairweather calorimeter.

Ammonia extraction in all the streams is by means of Livesey and rotary washers. For the washing process, cooled weak liquor, only, is used, which cascades throughout the washing system countercurrent to the gas. In all, there are 36 purifiers holding from 70 to 180 tons of oxide each. Steam heaters are provided at the inlets of each section to maintain the reactivity of the purifying material in cold weather. At the outlet of the purifiers, the streams of gas are washed with gas oil (to remove the naphthalene) and they then pass to the station meters—four of 250,000 and one of 150,000 c.ft. per hour capacity—before being mixed. The aggregate gasholder capacity of the works is 12 million c.ft.

COKE.

Fulham is one of the principal stations which supply coke for domestic purposes, and the Company have, accordingly, installed on the works special plant for the preparation of suitable coke. The new combined coke screening, cutting, grading, and washing plant was designed by the Company's own staff. The plant is over 100 ft. high, and receives coke from the retort house by conveyors which deliver immediately above the room from which the whole plant is controlled with the exception of the washing section. The coke is then cut and screened into four separate grades, two of which are washed. The storage bunkers are 184 ft. long and 45 ft. wide, with a total capacity of 2000 tons.

New research and works laboratories have recently been erected. No. 1 laboratory, on the first floor, occupies a floor space of 2700 sq. ft., and is used, exclusively, for general chemical research. On an upper mezzanine floor there is a conference room and library, with accommodation for about 4000 books. No. 2 laboratory, on the ground floor, is reserved for technical and semi-large scale work. No. 3 laboratory is used partly for research and partly for the chemical control of the operations carried out at the Fulham Works.

After the inspection of the works the visitors were enter-

tained at tea at the kind invitation of the Gas Light and Coke Company, Mr. Solomon presiding.

Mr. A. H. SOLOMON, after tea, said: "It is my privilege this afternoon on behalf of the Directors to give you a welcome to Fulham. The works at Fulham to-day are not what they were forty years ago, or even eighteen years ago when I came from Beckton to take charge. Eighteen years ago the maximum gas make was 7 millions. To-day we have two horizontal retort houses, a Woodall-Duckham installation and a Glover-West installation, with a total make of 22 millions. Extraordinary changes have taken place in a short time; one must not lose sight of the fact that one of the features of the Fulham Works is that it carbonizes 100 p.ct. Durham coal. To carbonize Durham coal in vertical retorts needs experience and attention, and if one expects any measure of success one must apply oneself very carefully to every detail of the plant. I am, of course, referring to the use of Durham coal. Personally I am rather keen on detail both on the works and in figures, and I am quite sure that no business can be carried on without detail. One is apt to chafe under and get irritated with red tape; but if you probe down you will find that all these small items of detail go to make one successful whole, and in that way one gets efficiency. I do urge this point of detail.

"Another important point is that once the coal is carbonized, look after the coke; let it be clean coke, and once you have clean coke, look after it. This essentially is a day of coke grading, and we must look after our coke customers. There is a tremendous lot of foreign coke coming into the country, and therefore we must pay a great deal of attention to our coke. The plant at Fulham is a very large one, and we have had a great deal of experience with it. We have had a very hard twelve months with this plant, and we shall not leave it alone until we have got it right. There are difficulties in grading coke, but we shall get over these in time.

"A point I should like to draw your attention to is the coal handling plant; we are very proud of it. It is a very efficient plant and one worthy of the men who put it in; it has worked excellently, and we take our coal from the ship to the retort mouthpiece at something like 2d. per ton." In conclusion, Mr. Solomon hoped that the visit had been an interesting one, and that from what they had seen they might be able to take away some ideas for the future.

The PRESIDENT (Mr. T. H. Prater), in proposing a very hearty vote of thanks to the Gas Light and Coke Company for the facilities afforded for this visit, said that he thought they would all agree that it had been a most interesting visit. At Fulham they had the peculiar fact that there were three methods of carbonization running at the same time and dealing with precisely the same coal, and they observed the result of that carbonization of Durham coal. They noticed that the vertical retorts in one house were Woodall-Duckham and in the other Glover-West. The 10-ton "W.-D." retorts were successfully carbonizing Durham coal. The Glover-West installation was doing the same thing, which dispelled the idea that vertical retorts were difficult to work with Durham coal.

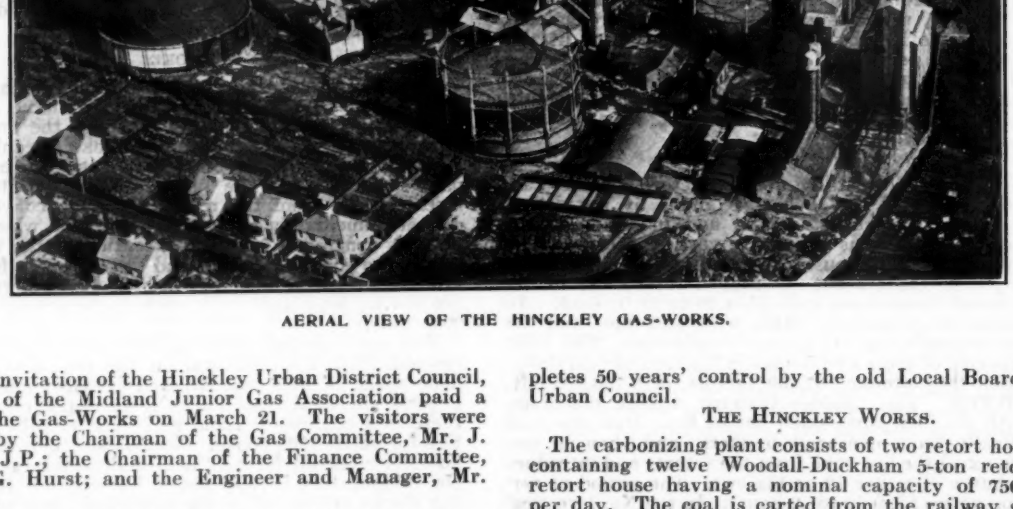
Continuing, Mr. Prater commented upon the coke-handling plant, which, he remarked, was the first plant he had seen where a serious attempt had been made to minimize the dust nuisance. This nuisance had been very successfully overcome. Then it would have been noticed that they also washed their coke, which process, although reducing the ash content only a small amount, did remove the solid lumps of shale which caused such inconvenience to the consumer. This was an important point in a district such as this, where a large amount of the coke was consumed in flats, where storage accommodation was usually limited. Mr. Prater also commented on the remarkable laboratories they had seen, and it was very interesting to observe the manner in which the Gas Light and Coke Company were delving into all questions that might concern gas production. Finally, Mr. Prater moved a hearty vote of thanks to the Company, Mr. Solomon, and his staff and guides.

Mr. J. H. GOLDSMITH (South Suburban), Senior Vice-President, seconding the vote of thanks, mentioned the various guides by name, and referred to the presence on that occasion of Mr. Hollings and Dr. Pexton. It was some years, he continued, since they had visited these gas-works, and they could see some of the amazing strides that had been made during the last few years. The coal-handling plant was no less than 700 yards long, and in the last five years had handled a million-and-a-half tons of coal and had given no trouble. In conclusion, Mr. Goldsmith remarked that the research laboratories were very fine.

Mr. SOLOMON briefly returned thanks for the vote.

Midland Junior Gas Association

Visit to the Hinckley Gas-Works



AERIAL VIEW OF THE HINCKLEY GAS-WORKS.

At the invitation of the Hinckley Urban District Council, Members of the Midland Junior Gas Association paid a visit to the Gas-Works on March 21. The visitors were received by the Chairman of the Gas Committee, Mr. J. Bennett, J.P.; the Chairman of the Finance Committee, Mr. H. G. Hurst; and the Engineer and Manager, Mr. Fred Lee.

Gas was first supplied in Hinckley in 1834 and the Local Board purchased the works in 1881. The present year completes 50 years' control by the old Local Board and the Urban Council.

THE HINCKLEY WORKS.

The carbonizing plant consists of two retort houses, each containing twelve Woodall-Duckham 5-ton retorts, each retort house having a nominal capacity of 750,000 c.ft. per day. The coal is carted from the railway sidings by tractor and trailers, and the coke removed from the retort house by an overhead runway. The total coal carbonized

is 13,000 to 14,000 tons per annum. The gas made averages 16,800 c.ft. of 475 B.Th.U., and 16 gallons of tar are made per ton of coal. The volume of ammoniacal liquor is kept as low as possible owing to the difficulty of disposing of the effluent from the making of sulphate of ammonia. About 600 gallons of effluent liquor, including all the devil liquor, is used on the three producers heating the retorts. This has been done intermittently for some time and continuously from January of this year, and has caused, so far, no difficulty or inconvenience, and no injury to the producers.

The gas from the retorts passes through four annular condensers, and then to a water-cooled condenser. The water required for the latter condenser is pumped from and returned to a gasholder tank, and by this means the gas is kept at a uniform temperature not exceeding 60° Fahr. After passing through exhausters, washers, &c., the gas passes through a "Connersville" meter to the holders (total capacity 1,600,000 c.ft.), all valves being controlled from the meter house, which also contains the station governor, maintaining a pressure of 4½ in. to 5 in. water pressure on the town mains.

A compressor having a capacity of 50,000 c.ft. per hour is used to send gas to three outlying districts, two to four miles from the works. Gas is compressed to 4 lbs. per sq. in. from 11 a.m. to 1 p.m. daily, and reduced by Reynolds governors to 5 in. water gauge. These have worked very well.

There is also a carburetted water gas plant of 250,000 c.ft. capacity, together with boiler plant, &c.

At the conclusion of an interesting afternoon, tea was provided, a hearty vote of thanks being passed to the Members of the Gas Committee and Staff.

"Formation of Cokes"

Dr. G. W. ANDERSON, who took part in the discussion on Mr. John Roberts' paper on "The Formation of Cokes" before the Institute of Fuel—see "JOURNAL" for March 25, p. 795—asks us to amend his remarks as follows:

A question of considerable importance arose out of the paper, and should be settled before processes for the production of coke could be considered. It concerned the factors influencing the combustibility of coke. There were two schools of thought. One regarded the volatile matter in the coke as the chief factor, while the other considered the structure of the coke had the greatest influence on its combustibility. Both views seemed to be adequately supported by experimental proof. Some years ago he had been associated with an undertaking, which had produced high-temperature coke from a blend of powdered coal and powdered high-temperature coke breeze. The results had been made public by Mr. E. V. Evans, in his Cantor Lectures to the Royal Society of Arts (1924). Although, as the result of the adoption of this practice, the rate of carbonization had increased, on the other hand, owing to the high percentage of breeze used (20 or 25 p.ct.), the throughput of the carbonizing plant, on the basis of pure coal, had been reduced, so that there was no gain, from the carbonizer's point of view. The coke produced was highly combustible, although it had contained no more combustible matter than high-temperature coke produced in the ordinary way. The scheme, however, had been abandoned, because the cost of production had become too high. The factor of throughput, he believed, would deter many people from using blends of any sort, as the throughput of the carbonizing plant would be reduced, even when different coals were used. Blending almost always necessitated crushing to a smaller size than was used ordinarily in the plant. The bulk density of the coal was thereby reduced from about 55 lbs. per c.ft. to about 45 lbs. per c.ft., and the throughput of the plant would be affected correspondingly. The increase in cost thereby incurred would be as serious as the loss of 3 or 4 p.ct. volatile matter in the coke, which corresponded to 5 or 6 therms per ton. It was the high volatile content of low-temperature coke which gave rise to a serious loss in revenue and often rendered low-temperature processes uneconomical. If the structure of the coke was accepted as the principal factor in influencing its combustibility, it seemed feasible that a suitable domestic coke could be prepared by a low-temperature process. If this coke were subjected subsequently to a higher temperature, the volatile matter could be drawn off and recovered. It was unlikely that this procedure would alter the original structure of the coke and thus its combustibility. A two-stage process, combining low-temperature and high-temperature carbonization, might be evolved which would serve both low-temperature and high-temperature interests. While it was essential for the former to increase their revenue from gas, it was equally important for the latter to develop their coke market, so that an economic relationship between gas and coke sales was preserved, which demanded the disposal of 10 cwt. of coke for every 70 therms of straight coal gas sold to the consumers.

NOTES ON PLANT AND PROCESSES

Gas Heating for Hot Water Supply.

The ever-increasing demand for economy in domestic labour, coupled with the convenience and utility of maintaining a supply of hot water constantly throughout the house, places the lagged gas-heated hot water supply apparatus at the forefront of the many forms of heating systems now in vogue.

A new catalogue on this subject has just been published by Messrs. Thomas Potterton (Heating Engineers), Ltd., of Balham, S.W. 12, which covers the full range of hot water appliances required by the architect, builder, or householder in equipping the home or factory with efficient gas-heated hot water apparatus, whether it is an entirely new installation or the re-modelling of an existing system.

In all cases, states the foreword of the catalogue, careful attention to lagging, of which many practical forms are available, should be given to circulations and storages not already so treated. Messrs. Potterton's thermal storage sets are claimed to work with the utmost flexibility, a consumption of 2 c.ft. per hour sufficing to maintain the water hot, while in full action they have an output of 25 to 35 gallons of hot water per hour.

The catalogue goes on to describe and illustrate the various types of Potterton apparatus for hot water supply. The "Emperor" and "Empire" gas boilers and thermal storage sets are dealt with in detail. Full details are given of Potterton's gas water-heating apparatus with patent "Victor" boiler and "snap-action" thermostatic control. Various accessories, including the bi-metal thermostat for use with Potterton installations are fully explained, together with particulars of capsule, rod, and air thermostats, the cut-out valve system, and the night valve, while specifications are included of "Urastone" fluepipes for use in conjunction with Potterton boilers. Full instructions for fixing the hot water supply apparatus complete a very interesting and useful booklet.

The "Walco" Pipe Wrench.

One of the most interesting tools that has been marketed for some time is the new "Walco" pipe wrench. It is made by the Walworth Company, long known for their popular "Stillson" wrench. The "Walco" wrench is intended to replace the "Stillson," and it certainly is a great improvement on the "Stillson," good as that wrench undoubtedly was.

The "Walco" consists of four parts only—a handle and jaw housing, forged in one piece, forged jaw, nut and spring. The jaw housing gives a big bearing surface for the jaw and makes side-play impossible. The wrench can therefore be used in awkward corners without fear of side-slip. The teeth are carefully designed and machined, and although they give a true grip of steel on the pipe, the wrench will never lock the pipe. The whole of the "Walco" wrench is specially heat-treated to give maximum strength and longest life. The spring can easily be removed and replaced without the use of tools. The teeth can be re-sharpened on an emery wheel as required.

The "Walco" wrench is available in sizes from 6 in. to 48 in., taking ⅛ in. to 6 in. pipe. It should be a most useful and reliable tool for all concerned with the fitting and maintenance of pipe lines.

REGISTER OF PATENTS

A Radiant and Convective Heater. No. 343,274.

WHITFIELD, C., of Acton, W. 3.

No. 1627; Jan. 17, 1930.

This invention relates to gas stoves for heating rooms of the kind having a burner with or without visible incandescent elements and a surrounding radiator shell heated by the hot products of combustion. The shell is designed to retain the products of combustion while hot, by arranging the outlet on a low level.

One or more screens are provided behind the radiator, and adjacent thereto, so as to provide one or more narrow passages for heating and circulating air into the room. These passages are open at the top, bottom, and sides, with or without one or more funnel-like passages open only at the top and bottom.

Fig. 1 is a pictorial illustration of one example of gas stove made in accordance with the invention; fig. 2 is a front half-sectional elevation of fig. 1; fig. 3 is a side sectional elevation of fig. 1; and fig. 4 is an underneath plan.

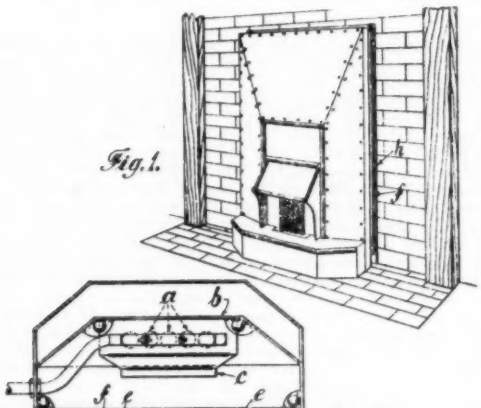


Fig. 4.

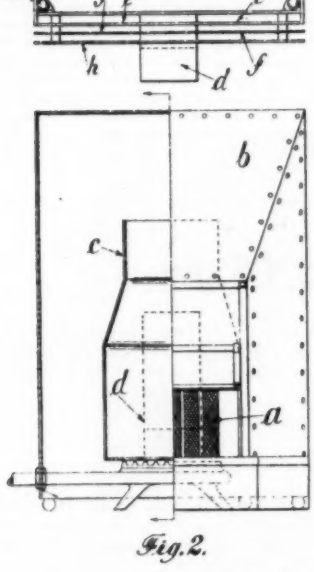


Fig. 2.

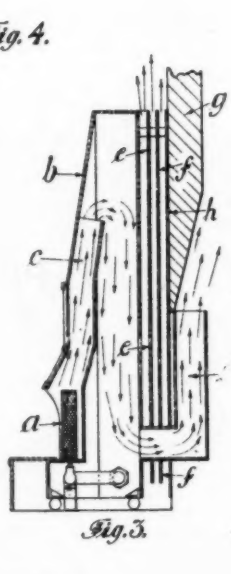


Fig. 3.

Radiant and Convective Heater.

The apparatus comprises a small incandescent radiant unit *a* arranged centrally in the front, and at the bottom, of a radiator which consists of a hollow metal shell *b* of any design and shape suitable for standing in the hearth in front of the chimney. Within the shell is an outlet or flue *c* from the radiants, leading to the top of the shell, while from near the bottom of the shell and behind the fire is an outlet *d* from the shell to the chimney in the form of a flue pipe.

Baffles (not shown) may be arranged in the radiator shell to provide surfaces for directing the gases of combustion within the shell and absorbing the heat from them. Behind the stove is a screen in the form of two plates *e* and *f*, of which *e* is connected to the back of the radiator shell so as to provide an open air funnel and a passage behind the shell, both being open at the top and bottom, and the passage being open also at the sides. The top is sufficiently above the chimney canopy *g* so as to direct the air from the funnel and passage into the room, and the flue outlet *d* from the radiator being extended well into the chimney under the canopy. A heat-insulating baffle *h* may also be provided as shown, but it is found that very little heat passes the screen, and this baffle may therefore be omitted if desired. The screen is of any suitable shape, and may fit against the stiles of the fireplace. Any suitable provision may be made for dealing with condensation in the radiator, but is not necessary, as condensation will not ordinarily occur.

In operation, radiant heat is obtained from the elements of the incandescent radiant unit above the burners, from which the hot gases pass up the flue *c* into the upper part of the radiator shell *b*. The hot gases disperse within the radiator, heating the same, and as they cool or are displaced by hotter gases they descend in the radiator until they finally pass out through the flue *d* at the bottom to the chimney. The radiator soon becomes very hot and emits low-temperature radiation, which quickly warms a room and the air in it, owing to its large surface. Heat which is radiated towards the chimney back falls upon the plates *e* and *f* of the screen, and air passing up the back of the radiator is heated, as also is that between the plates of the screen, so that hot air rises into the room heated from behind the radiator, which heat would otherwise be lost.

Complete Gasification.—No. 344,205.

HUMPHREYS & GLASGOW, LTD., of Westminster (Assignees of CHRISMAN, C. S., of Philadelphia).

No. 6244; Feb. 25, 1930. Convention date, May 6, 1929.

The present invention relates to complete gasification. The object is in general to recover in the combustible gas a larger proportion of the volatile materials of the coal than is recovered in ordinary water gas practice. The greatest difficulty encountered in the complete gasification processes thus far proposed, state the patentees, has been the securing of proper carbonization of the fuel in the upper portion of the fuel bed.

This invention is chiefly addressed to obviating the necessity of making a down-run, and relates to a method and apparatus whereby the entire water gas run may be carried on upward, without sacrificing efficient operation in the water gas zone of the fuel bed, and thereby providing a large volume of hot water gas all of which may readily be passed through the uncarbonized fuel to effect its carbonization; and whereby the hot oil gas produced in carburetting the gas from the generator if the gas is carburetted is conveniently utilized for carbonization.

According to the invention, upward steaming, which alternates with upward air blasting, is effected by steam admitted sufficiently above the bottom of the fuel bed to leave the base thereof unchilled by the steam and at a suitable temperature for prompt ignition by the succeeding air blast. The whole of the water gas produced is thus rendered available for passing through the fresh uncarbonized fuel, and, if desired, some of the water gas may be led off from the top of the water gas zone and be superheated, carburetted, and returned to the generator so as to pass through the fresh uncarbonized fuel.

The apparatus for the manufacture of gas by this process comprises a generator having a carbonization chamber and a gasification chamber, an inlet port for gas-making fluids at the bottom of the gasification chamber, an inlet port for gas making fluids in the axis of the gasification chamber near the bottom thereof, and an off-take conduit for gas having its inlet in the centre of the top of the gasification chamber and extending through the carbonization chamber. A connection may be provided between the carburettor and the generator leading from the top of the gasification chamber to one end of the carburettor; also a connection between the opposite end of the carburettor and the gas offtake, and means for circulating gas through the connections.

Injectors for Gas Burners. – No. 343,506.

SAUNDERS, A. F., WORTLEY, G. W., and R. & A. MAIN, LTD., all of Falkirk.

No. 34,667; Nov. 13, 1929.

An object of this invention is to provide means whereby a delicate adjustment of the flow of gas may be obtained. According to the invention an injector for a gas burner comprises a gas chamber, an injector member at one end of the chamber and having a number of perforations therein, a shutter having a gear track thereon, which shutter controls the area of the perforations, a pinion which engages the track and is mounted on a spindle extending out through a wall of the chamber, and means for independently controlling the pressure of gas flowing through the injector.

The injector member comprises a flat perforated plate and the shutter has a flat face or faces in engagement with the plate and the gear-track is formed on the face of the shutter opposite the flat face. Preferably the shutter is spring-pressed into engagement with the flat perforated plate.

One of the usual objections to an injector having a variable gas outlet as described, state the patentees, is that, as the outlet area is decreased, a hissing sound is caused by the gas issuing therefrom. To prevent this hissing it is necessary to correlate the gas pressure in the gas chamber with the size of the injector outlet: and a feature of the invention consists in providing a pressure regulator for that purpose, which regulator controls the flow of gas into the gas chamber.

The gas chamber is provided with a slotted tubular sleeve located therein, and has an annular gas inlet passage around the sleeve, which tubular member accommodates an axially

movable plunger. With this arrangement the gas can only flow to the injector member through those portions of the slots in the tubular member which are between the head of the plunger and the injector member. Preferably the axially movable plunger is provided with a screw-threaded stem which extends through a threaded bore in the end wall of the chamber. Another aspect of the invention is the particular design and arrangement of the injector member and shutter whereby the flow of gas may be delicately adjusted. According to the invention the perforations in the injector member are so grouped, and the shutter is so shaped, that a progressively increasing number of perforations are simultaneously opened or a progressively decreasing number are simultaneously closed by relative movement between the injector member and the shutter. The shutter is so formed that a certain central group of perforations remains at all times unobscured by the shutter.

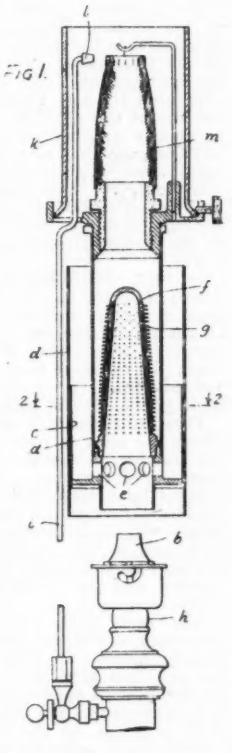
Intermittently Operating Gas Burner. No. 343,579.

SOUTH METROPOLITAN GAS COMPANY and PEARSON, A. R., both of 709, Old Kent Road, S.E. 15.

No. 35,810; Nov. 22, 1929.

This invention is based on the idea that a bunsen burner suffering from the defect that it back-fires easily might become useful in providing an intermittent flame. The problem to be solved is the repeated extinction of the flame in the burner tube without creating in the tube such a high temperature that, after a few renewals of the desired flame, the mixture of air and gas rising in the tube continues to burn therein.

The invention, state the patentees, solves the problem by placing in the burner tube a device which extinguishes the back-firing flame not only by depriving it of heat, but also by confining to a large extent the products of combustion. The usual construction of the burner is departed from. The flame at the mouth of the burner tube remains there a very short time and then passes down the tube. Within the tube is the device which extinguishes the flame, and at the mouth of the burner tube is a device for kindling the mixture of gas and air, such as a pilot jet.



The invention is particularly useful for producing intermittent light, for which purpose an ordinary gas mantle, either upright or inverted, is used. In this case the heat retained by the mantle, aided, it may be, by the catalytic effect of the usual mantle, ignites the gas-air gas mixture coming to it up the burner tube. The burner having been kindled, the mantle glows for a short period until the flame passes down the burner tube, leaving products of combustion in the upper part of the tube. The flame is extinguished, but fresh mixture passing up the tube sweeps out the products of combustion and at the mouth of the tube the mixture is again ignited, and the cycle repeats itself.

The device for extinguishing the flame in the burner tube is a hollow cone pierced with a large number of small holes, through which the mixture of gas and primary air passes. The holes are of such dimensions, and so spaced, that the flame is split up into a number of small flames which are then extinguished by the cooling effect of the material of the cone and the admixture of combustion products in the space around the cone. The frequency of the cycle depends largely on the speed of propagation of flame through the mixture of gas and primary air. When the burner becomes hot, the proportion of air in the mixture, and therefore the frequency, tends to increase owing to the "chimney" effect of the burner tube. To counteract this effect, and make the device operate at a steady frequency, an outer jacket may be fitted, so that the air has to be drawn through the space between the jacket and the burner tube. The ingoing air is thus heated and resists the "chimney" effect of the burner tube. The outer tube may be adapted to slide so that it can be adjusted to aid in producing any desired frequency.

The diagram shows an elevation partly in vertical section.

The burner tube *a* is mounted in the usual manner over the ejector *b* and is surrounded by the cylinder *c* on which slides the sleeve *d*. Above the air inlets *e* of the burner tube is mounted the brass cone *f*, which is perforated as indicated and has a number of annular fins *g*. The gas supply fitting *h*, by-pass tube *i*, and glass *k* are of usual construction. The several parts are adjusted in accordance with the conditions cited above, so that when the gas is turned on and becomes ignited by the pilot jet *l* the mantle *m* glows until the flame passes down the burner tube and is extinguished by the cone, whereafter the operation is that explained.

The air, which is drawn through air inlets *e*, is drawn down the annular space between the sleeve *d* and the burner tube *a*, whereby the air is heated, so that the desired frequency of the intermittent flame is not disturbed, this effect of the sleeve being variable by sliding the sleeve up or down on the cylinder *c*.

Tinmen's Stoves.—No. 343,656.

SOUTH METROPOLITAN GAS COMPANY and CHANDLER, D., both of 709, Old Kent Road, S.E. 15.

No. 39,102; Dec. 20, 1929.

This invention relates to tinmen's stoves, which are heated by the products of combustion and are employed for heating soldering irons. In stoves of this kind heretofore commonly in use, state the patentees, the bit has been subjected to the products of combustion, which have an injurious effect on its surface.

According to this invention, a retort is adapted to receive a soldering iron, the outer surface of the retort being heated by the products of combustion.

In one form of construction, the stove comprises a refractory lined metal casing, in which are located two retorts made of metal which does not readily oxidize. The retorts are arranged horizontally one above the other, with a small space between. To equalize the temperature of the two chambers, the walls of the bottom retort are thicker than those of the upper retort. The open end of each retort is provided with a flange and two lugs, by which it can be secured in position to the front of the stove, while the rear end of the retort is supported by a projection which fits into an appropriate recess in the refractory lining at the rear of the stove.

Detection of Carbon Monoxide.—No. 343,724.

GRICE, C. S. W., of Sheffield.

No. 4213; Feb. 7, 1930.

The following claims are made by the patentee of this invention:

1. Apparatus for the detection of the presence of, and the determination of the proportions of, gases such as carbon monoxide which on combustion yield carbon dioxide. The apparatus includes a chamber containing reagents for the oxidation of the carbon monoxide, a chamber containing a reagent adapted to absorb carbon dioxide formed by the oxidation, and an indicator adapted to undergo a colour change when a given proportion of carbon dioxide has been absorbed. A hand-operated pump of the solid piston type is provided, the proportion of the constituent which it is desired to estimate being calculated from the number of strokes of the pump necessary to cause the indicator to undergo a colour change.

2. The chamber in which the preliminary treatment of the gas is effected contains in a plurality of layers anhydrous calcium chloride or some other suitable chemical for the removal of water vapour from the air; soda asbestos, or caustic potash or caustic soda, or any other chemical suitable for the removal of carbon dioxide from the gas; "Hopcalite" or some similar catalyst to promote by catalytic action the conversion of carbon monoxide to carbon dioxide by oxidation with the oxygen present in the gas, and a further layer of material for the removal of any moisture which may enter through a momentary reversal of the gas current or may arise in consequence of the action of the catalyst.

3. Apparatus as claimed in either of the preceding claims in which the reagent containing the indicator is a standardized dilute solution of an alkali to which has been added a quantity of thymol blue or the like indicator which will change in colour with changes in the alkalinity of the solution due to its taking up a greater or less proportion of carbon dioxide.

4. Apparatus as claimed in any of the preceding claims in which the indicator is absorbed by granulated pumice.

Street Lamps as Warning Signals.—No. 344,095.

SOUTH METROPOLITAN GAS COMPANY and CHANDLER, D., both of 709, Old Kent Road, S.E. 15.

No. 38,391; Dec. 14, 1929.

This invention relates to street lamps suitable for giving warning signals. The main object is to provide means for projecting a beam of reflected light so that the drivers of vehicles and other persons may see the signal from a distance.

The invention is particularly suitable for street lamps in which the source of illumination (for example, inverted incandescent gas mantles) is located in an inverted cup-shaped casing forming the body of the lamp, serving to reflect the light downwards, and masking the direct rays from persons at a distance.

A lamp is provided with one or more reflectors arranged below the source of illumination, preferably at an angle of about 45°, and so located as to reflect a beam or beams of light away from the lamp so as to be visible to persons at a distance. Means are provided for adjusting the angle of the reflector so that the distance at which the beam is visible can be varied. A beam of coloured light can be directed.

In the case of a lamp having four reflectors, these may be arranged in the form of a pyramid and may be enclosed in clear glass to protect the reflectors, which may conveniently be formed of silvered glass.

Devon Gas Association.

The 25th Annual Meeting of the Devon Gas Association, Ltd., which owns eleven gas-works, was held at the Head Offices, Haven Road, Exeter. Mr. WM. CASH, F.C.A., J.P., presided, and moved the adoption of the Directors' report and statement of accounts for the year. The dividend recommended was again 7½ p.ct. per annum.

Referring to the increase during the year, the CHAIRMAN said this was partly due to the acquisition of the Kingsbridge Gas Undertaking, and the inclusion of that Company's trading in the accounts of the Association for the year. It was gratifying to note that the majority of the Kingsbridge shareholders had voluntarily elected to take shares in the Association in exchange for their original holding in the Kingsbridge Company.

The revenue account showed a profit of £5730, as compared with £4767 for the previous year, and referring to the statistics published with the accounts, the chief item, gas sold, had gone up from 62 million to 80 million c.ft., an increase of 18 million, of which just over 15 million was due to the inclusion of the Kingsbridge Undertaking. The Association was constantly adding to its works, and one test of the expenditure was to look at the capital per million c.ft. worked out on the quantity of gas made, and for the last three years the comparison had been as follows:

	Per Million C.Ft.
1928	£932
1929	£843
1930	£782

showing the rapidly improving position of the Association as regards capital in relation to output.

It would be seen from the accounts that a sum of £500 had been taken from income-tax reserve, and that a like sum was being transferred to general reserve. It would therefore be apparent that this was a mere transfer from an internal reserve to a visible reserve, and the money had not been used to pay dividends. In fact, the Company were doing better than this, because they were using a further sum of £500 out of profits to write down goodwill and stamp duty arising in connection with the acquisition of the Kingsbridge Undertaking.

Mr. R. J. REW (Managing Director) seconded the adoption of the report, and a dividend of 7½ p.ct. was declared for the year.

Ilfracombe Gas Company.

The Annual Meeting of the Ilfracombe Gas Company was held in the Board Room of the Company—Mr. R. M. ROWE, C.C. (Chairman of the Board of Directors), presiding.

The Directors' report showed an available balance of £3177, after paying an interim half-yearly dividend of £2 10s. p.ct. on the preference stock, and £3 5s. on the consolidated ordinary stock, and £1350, the cost of a new lift to one of the gasholders. The Directors recommended a further payment of £2 10s. p.ct. on the preference stock, and £3 5s. p.ct. on the consolidated ordinary stock. The Directors reported an increase in the sale of gas.

Moving the adoption of the report and balance-sheet, Mr. ROWE referred to the great loss the Company had suffered in the passing of Mr. E. J. Tamlyn, who had for thirteen years been a valued member of the Directorate. Dealing with the accounts of the Company, the Chairman continued: The statements of stock and loan capital, and the capital account remain unaltered. I want, however, especially to refer to the question of the Company's paid-up capital, which, including premiums received, and allowing for the unexpended balance of £4840, stands at £65,187. The Directors congratulate stockholders and consumers on the provision, for all time, of freehold premises situate in the very heart and hub of the town, which will be available for intensive publicity purposes, and where, in attractive showrooms staffed with well-trained attendants, more successfully and profitably will be demonstrated to the Company's customers the thousand-and-one uses to which the commodity of gas may be applied.

Now I come to deal with the revenue account, and the first item to which I would draw your attention is the cost of coal into store, which stands at £11,157, against £10,886 for the previous year. The average price per ton was 28s. 9d., as compared with 28s. the previous year. The quantity of coal carbonized in 1930 was 7770 tons, against 7760 in 1929. The net cost of coal after deducting the receipts from coke and residuals was £5998, or 15s. 5d. per ton, against £5843, or 15s. per ton, for the preceding year. The total cost of manufacture is £17,822, against £17,627—an increase of £195. Distribution costs are higher by £77. The cost of renewals and repairs to public lamps is £515, against £522 for 1929, and, apropos the public lighting, the Ilfracombe Council has always recognized that gas is the best and cheapest medium for street lighting purposes. In this respect our town is keeping in line with many other up-to-date local authorities who want a reliable light which is obtained in gas.

On the other side of the revenue account, however, you will observe that the receipts from the sales of gas are up by £575, the increase in the sales representing 13,009 therms, or 2,738,500 c.ft. Actual profit from the sale of fittings is down by £205, substantially accounted for by the policy of the Board in encouraging the sale and installation of gas appliances on a very low margin of profit, and consumers are asked to note that this policy will be continued to their distinct advantage. During the year 470 additional appliances have been sold. The sales of coke have been more satisfactory, and there is an increase of £868 under this head over the previous year. With increased carbonization more coke has been manufactured, and a slightly better price for this bye-product has been obtained outside the Company's gas area. Tar receipts are lower by £164. Sulphate of ammonia shows a loss of £52, against a profit of £35 in 1929.

Summing up the year's working results, the gross profits for 1930 are £4296, against £4225—an increase of £71, and these figures show a surplus of £386 over the Company's standing charges of £3910, which must be regarded as entirely satisfactory.

Mr. Rowe then formally moved the adoption of the report and balance-sheet and the payment of the dividends as indicated in the Directors' report, which was seconded by Mr. J. VICKERY.

Hemel Hempstead District Gas Company.

After an existence of fifty-four years the Hemel Hempstead District Gas Company held its last Annual General Meeting on Monday, March 30—Mr. SAMUEL CUTLER, Chairman of Directors, presiding.

The works and property of the Company were as from Wednesday, April 1, taken over by the Watford and St. Albans Gas Company.

The CHAIRMAN, whose father was one of the original Directors of the Hemel Hempstead Company, gave some interesting glimpses into the past history of the Company. He said that the Hemel Hempstead and Boxmoor Gas and Coke Company was incorporated on Feb. 11, 1869, and Mr. William Osborn was appointed its first Chairman. Gas was first manufactured on the site of the existing works in that year, but for some years previously another undertaking, called the Hemel Hempstead Gas Company, had been producing gas at works situated in Bury Road, from which it supplied the northern end of the Borough.

In 1878, the two Companies amalgamated, and the Hemel Hempstead District Gas Company came into being, and the two systems of mains were linked together, and gas was supplied to the Hemel Hempstead district from the site of the present works.

In 1904, continued the Chairman, the Hunton Bridge and Abbots Langley Gas Company amalgamated with this Company, thus increasing further the area of supply. In 1895, the make of gas was 21,500,000 c.ft.; in 1905 it had increased to 48 millions; in 1915 it was 77 millions; and in 1925 it was 125 millions. In the year 1929 this had been still further increased to 160 millions. The annual output of the Company had doubled in 10 years, 1918 to 1928.

Presenting the accounts for the year, the Chairman said: There has been an increase of 1·82 p.ct. in the sale of gas, while the number of consumers had increased from 5348 to 5635—an increase of 5·36 p.ct. The capital expenditure had been increased by £11,580, but we have now practically completed the modernization of our works, and as a result we have a works which will bear comparison from the standpoint of efficiency with any in the country. The new carbonizing plant, which has now been working for 15 months, has proved entirely satisfactory, and has resulted in considerable savings in the cost of works wages.

The result of the year's working shows that we have made a net profit of £10,438, which is higher than last year by approximately £2600. To turn to the profit and loss account, it will be seen that after providing for all charges and placing £1000 to the reserve fund, there is a credit balance of £9309, which will enable us to pay final dividends for the year ended Dec. 31, 1930, of 5 p.ct. on the "A" and "B" ordinary stock, 3½ p.ct. on the "C" ordinary stock, and 3 p.ct. on the 6 p.ct. preference stock, subject to income-tax, which payments will absorb £2511, leaving £6797 to be carried forward, compared with £5204 last year.

The report and accounts, also the recommendation as to dividends, were adopted.

Parliamentary Intelligence

[From Our Special Correspondents.]

House of Commons.

Private Bills.

The Guildford Gas and Cranleigh Electricity Bill has passed its third reading.

On the Report Stage of the Aldershot Gas, Water, and District Lighting Bill, Mr. Thorne inquired why its title had been changed to Mid-Southern District Utility Bill, and whether any other alteration was involved. Sir Robert Young, the Chairman of Ways and Means, said that he understood the altered title was to make more clear the area comprised in the Bill. The Bill subsequently passed its third reading.

The Lowestoft Water and Gas Bill has been read a second time and committed.

Special Order.

Plans have been deposited in connection with the Rotherham Corporation Gas Order.

Leamington Priors Gas Company.

The 132nd Ordinary General Meeting of the Leamington Priors Gas Company was held at the Gas-Works—the Chairman (Dr. HAROLD MASON, J.P.) presiding.

Dr. MASON, in his opening remarks, said the Company had done fairly well during the half-year, and perhaps the first item in the accounts calling for comment was the application of the reserve fund to the reduction of the balance owing on the new vertical retort house. It was the intention of the Directors to restore this fund as opportunity arose. Out of a total expenditure of, roughly, £45,000 on the new retort house in 1928 only just over £7000 was still outstanding. The slight profit of £48 shown on purifying was not due to any new process, or to the purifying not being properly carried out, but to it so happening that several hundred tons of purifying material had reached saleable condition and had been sold during the half-year. It occasionally happened that a large quantity was sold in one half-year. The last time that a profit had been shown on purifying was in 1917.

In view of the reductions in output recorded by some companies, their own 4 p.ct. increase for the half-year and a slight increase for the whole of 1930 compared with 1929 was gratifying, and was partly due to the new houses which had been built, in practically every one of which gas was being used.

Owing no doubt partly to the impression they had formed of public lighting in Leamington and partly to opinions expressed at the Conference of the Association of Public Lighting Engineers last summer, the Whitnash Parish Council in November last had placed an order with the Company to provide, fix, light, and maintain 15 up-to-date public lamps, and he would like to congratulate the Parish Council on the very careful way in which these lamps had been placed, enabling the best lighting value to be obtained for the money expended.

Dealing with bye-products, there was a pleasing increase in the returns from coke. They had sold a little more, and, on the average, they had obtained rather better prices without making any increase in local prices. For some time past they had been trying hard to give the public of Leamington and the surrounding parishes a coke service which in prompt delivery carried out tidily and, in attention to individual requirements, adequately met the needs of all users of solid fuel.

The report was unanimously adopted.

Wellington (New Zealand) Gas Company, Ltd.

At the Sixty-First Annual Meeting of shareholders of the Wellington Gas Company, Ltd., the Chairman of Directors, Sir HAROLD BEAUCHAMP, presided.

In moving the adoption of the annual report and balance-sheet, the CHAIRMAN said: In spite of the adverse conditions with which we have had to contend, the result of the year's working will, I am sure, be regarded as satisfactory, as it will compare favourably with any of its predecessors. The increase in the gas consumption for the past year was 27 million c.ft. During the past five years our increase has been 143 millions; 11,600 cookers have been fixed; and 81 miles of mains laid. It is gratifying to report that we had a good year for the sale of gas appliances. The figures are:

Cookers	2281
Gas fires	223
Bath heaters	573
Gas coppers	308
Additional meters fixed	1131

During the past year we have made several extensions to our reticulation system. In all 10 miles of mains were laid, making the total length 250 miles.

Notwithstanding the many difficulties we have had to face, it will be noted that the year closed with a balance to the credit of profit and loss of £32,871. After making provision for depreciation, we recommend the payment of a dividend of 4 p.ct. for the past six months. This, with the interim dividend paid in August last, will give you a return of 8 p.ct. for the year. If you approve of the appropriation suggested by the Board, we shall carry forward £21,719, which is slightly less than the previous year.

There are 184 employees in the superannuation scheme. The total life cover is £130,000. The amount paid by the Company was £2701. The scheme is working to the entire satisfaction of those assured.

The Board subsidizes pound for pound contributions from the employees. This enables members, by paying 6d. per week, to receive £2 weekly during sickness. At present there are 169 members. The cost to the Company was £227. The total wages paid for the past year was £76,193.

The motion for the adoption of the report and balance-sheet was seconded by Mr. GERALD FITZGERALD, and carried.

Further Company Results in 1930

Barnard Castle.

At the Annual Meeting of the Barnard Castle Gas Company—Col. H. C. Watson presiding—a profit of £1869 was reported. A dividend of 4 p.ct. on the consolidated stock and £2 17s. 1d. p.ct. on the new ordinary stock (absorbing £403) was declared, leaving £1446 to carry forward. The Chairman mentioned that the amount of gas unaccounted-for through wastage had been reduced from 15 p.ct. of the total made to 11·5 p.ct.

Lichfield.

The Annual Meeting of shareholders was held at the Company's offices. Mr. G. S. Russell explained in detail the balance-sheet, the capital account, and the profit and loss account. As the result of the year's trading a dividend of 10 p.ct. was passed. Thanks were expressed to the Board and to Mr. Key, the Engineer and Manager, who in returning thanks on behalf of himself and the staff commented upon the methods adopted by the Electricity Department by removing gas fittings, &c., which was not considered fair competition.

Prescot.

The amount available for dividend by the Prescot and District Gas Company is £4756, and in addition to the interim dividend for the half-year ended June 30 last and paid on Sept. 1, 1930 (subject to income-tax), the Directors recommend that the following dividends (subject to income-tax) be declared—viz., for the half-year ended Dec. 31, 1930: On £4510 preference "C" stock, at the rate of 4 p.ct.; on £8420 preference "C" stock, at the rate of 4½ p.ct.; on £3070 preference "C" stock, at the rate of 5 p.ct.; on 17,000 consolidated ordinary shares, at the rate of 5 p.ct.; on £7500 redeemable preference stock, at the rate of 6 p.ct.; and on £16,145 preference shares, at the rate of 6 p.ct.; amounting to £2623, which will leave a balance to the credit of revenue account of £2133. The Directors are pleased to report that in spite of trade depression generally, and the low prices for residuals, there has been a small increase in the gas sold, and the profit has been fully maintained. The Rainhill Gas Undertaking was formally taken over as from Jan. 1, 1930.

Seaham Harbour.

The Seaham Harbour Gas Company report profits for the past year amounting to £2596—an increase of £146 over the previous year. Dividends approved were 2¼ p.ct. on preference stock, making 4½ p.ct. for the year; 3 p.ct. on the "A" stock and "B" shares, making 6 p.ct. for the year; and 2¼ p.ct. on the "C" stock, making 4½ p.ct. for the year. Mr. Malcolm Dillon, Chairman, said at the Annual Meeting that many of the inhabitants who had had electricity installed continued to use gas, so that the Company had not felt the introduction of electricity so much as might have been expected.

Winchester.

The Directors of the Winchester Water and Gas Company submit the following report for the year ended Dec. 31, 1930. The balance of net revenue available for dividends is £11,883. Interim dividends of £2 and £2 15s. p.ct. on the preference stocks and £2 10s. p.ct. on the consolidated ordinary stock, less income-tax, were paid on Sept. 1 last, and the Directors recommend the payment of final dividends of £2 and £2 15s. p.ct. on the preference stocks and £3 p.ct. on the consolidated ordinary stock, all less income-tax, the additional ½ p.ct. on the consolidated ordinary stock representing the undivided portion of the authorized dividend for the half-year ended June 30, 1905. The sale of gas during the year has increased by over 2 million c.ft. This must be regarded as very satisfactory in view of the weather conditions and the large increase in 1929 over 1928. Following the resolutions of the stockholders at the extraordinary general meeting held on May 26, 1930, the Directors offered for subscription by tender £20,000 5 p.ct. irredeemable preference stock at a minimum price of £97 p.ct. It is gratifying to report that the issue was subscribed more than twice over, and allotment was made at the average price of £98 11s. 9d. p.ct. In addition, the Directors have issued £2500 5 p.ct. irredeemable debenture stock at £103 p.ct. to some of the applicants who were unsuccessful in securing an allotment of preference stock.

Woking.

In comparison with the year ended Dec. 31, 1929, the quantity of gas sold by the Woking District Gas Company shows an increase of 10,422,022 c.ft., or 5·72 p.ct., but receipts from sale of residual products show a decrease of £823. The net gains in consumers during the year number 364, and 867 cookers, gas fires, &c., have been fitted. The profit on the year's working, including interest received, after charging interest on debenture capital, temporary loans, and income-tax, amounts to £7802, which, with £6204 brought from the previous year, makes a disposable balance of £14,007. Interim dividends were declared by the Directors on account of the year ended Dec. 31, 1930, at the following rates (*less* income-tax): On the "A" ordinary stock, £5 p.ct.; on the "B" ordinary stock, £3 10s. p.ct.; on the "C" preference stock, £2 10s. p.ct.; and on the 8 p.ct. redeemable preference stock, £4; and the Directors now recommend that final dividends for the year ended Dec. 31, 1930, be paid as follows: On the "A" ordinary stock, £5 10s. p.ct., making £10 10s. p.ct. for the year; on the "B" ordinary stock, £3 17s. p.ct., making £7 7s. p.ct. for the year; on the "C" preference stock, £2 10s. p.ct., making £5 p.ct. for the year; and on the 8 p.ct. redeemable preference stock, £4 p.ct., making £8 p.ct. for the year. These dividends will absorb £7290, leaving a balance of £6716 to be carried forward to next account.

GAS MARKETS & MANUFACTURES

Stock Market Report.

[For Stock and Share List, see later page.]

Conditions on the Stock Exchange last week were quiet but steady, but the volume of business showed no signs of increasing. Gilt-edged securities again made the best showing, though towards the close there was a revival of interest in some home industrial specialities.

As the investment demand at the present time is for the most part confined to high-class securities, it is not surprising that increasing difficulty is experienced in satisfying the demands for gas stocks. Except in the case of the largest undertakings there is very little stock available, especially among preference and debenture issues, and a standing order will be necessary if a purchase is desired. Business last week, therefore, was again mostly confined to the stocks of the three Metropolitan Companies. Prices continued firm with a tendency to harden, and, apart from *ex* div. reductions, there were no falls in value. Imperial Continental recovered the 5 points set-back of the previous week, while Barnet 7 p.ct. advanced a further 4 points to 124-129. Gas Light 4 p.ct. preference and South Metropolitan 6 p.ct. preference both rose 1 point to 78-81 and 112-113 respectively. Both these stocks are irredeemable, and in the case of the latter Company ranks for dividend in front of £6,709,895 ordinary stock, thus creating an attractive permanent investment. The yield at the current price works out at £5 5s. 8d. There are other preference issues quoted in the Stock and Share List which offer a very satisfactory return, and among these are the following:

—	Current Price.	Yield. P.Ct.
		£ s. d.
Aldershot 4 p.ct.	77½	5 3 3
Newcastle 4 p.ct.	74½	5 7 4
Tottenham 5½ p.ct.	102½	5 7 3
Wandsworth 5 p.ct.	96½	5 3 7

Among those not yet quoted in the List South Suburban 5 p.ct. changed hands last week at par.

Current Sales of Gas Products.

The London Market for Tar, Tar Products, and Sulphate.

LONDON, *April* 13.

The values of tar products are as follows:
Pitch, 45s. per ton f.o.b.
Creosote, for export, 5¼d. per gallon f.o.b.
Pure toluole, 1s. 11d. per gallon; pure benzole, 1s. 6d. to 1s. 7d. per gallon; 95/160 solvent naphtha, 1s. 4d. to 1s. 5d. per gallon; pyridine bases, 3s. 3d. to 3s. 6d. per gallon.
All prices of spirits are *ex* sellers' works.

Tar Products in the Provinces.

April 13.

The average prices of gas-works products during the week were: Gas-works tar, 17s. 6d. to 21s. 6d. Pitch—East Coast, 42s. 6d. to 43s. f.o.b. West Coast—Manchester, Liverpool, Clyde, 42s. 6d. to 43s. f.o.b.* Toluole, naked, North, 1s. 6¾d. to 1s. 7¼d. Coal-tar crude naphtha, in bulk, North, 5½d. to 6d. Solvent naphtha, naked; North, 1s. 2d. to 1s. 2½d. Heavy naphtha, North, 11d. to 1s. Creosote, in bulk, North, liquid and salty, 3¾d. to 3½d.; low gravity, 1¼d.; Scotland, 3¼d. to 3½d. Heavy oils, in bulk, North, 5⅝d. to 5⅞d. Carbolic acid, 60's, 1s. 1d. to 1s. 2d. Naphthalene, £10 to £12. Salts, £3 to £5, bags included. Anthracene, "A" quality, 2½d. per minimum 40 p.ct., purely nominal; "B" quality, unsaleable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port, it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *April* 11.

More movement is noticeable in most products, but prices continue rather weak. Creosote oil has been commanding considerable attention during the week.

Pitch.—Orders are scarce, and values are nominal at 40s. per ton f.o.b. Glasgow for export, and about 42s. 6d. per ton *ex* works for home trade.

Refined tar to Ministry of Transport specification continues in good demand at previous level—viz., 2½d. to 2⅝d. per gallon f.o.r. makers' works in buyers' packages.

Creosote.—There has been considerable activity in most grades. B.E.S.A. Specification is 2⅝d. to 3d. per gallon; low gravity, 3¼d. to 3⅜d. per gallon; and neutral oil, 3d. to 3⅛d. per gallon—all f.o.r. in bulk.

Cresylic.—Very few orders are being received, but prices remain unchanged. Pale, 97/99 p.ct., is 1s. 4d. to 1s. 5d. per gallon; dark, 97/99 p.ct., 1s. 3d. to 1s. 4d. per gallon; and pale, 99/100 p.ct., 1s. 6d. to 1s. 7d. per gallon—all *ex* works.

Crude naphtha is in good demand at 4d. to 4½d. per gallon, f.o.r. in buyers' rail tanks.

Solvent naphtha.—Stocks are accumulating gradually, and quotations are irregular; 90/160 is 1s. 2d. to 1s. 3d. per gallon, and 90/190, about 1s. per gallon.

Motor benzole is quiet with value about 1s. 2d. to 1s. 3d. per gallon.

Pyridines.—Unchanged, with 90/160 grade nominal at 3s. to 3s. 3d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole:

	s. d.		s. d.	
Crude benzole	0 5½	to	0 6½	per gallon at works
Motor "	1 0	"	1 1	" " "
Pure "	1 4	"	1 5	" " "

Trade Notes.

Continuous Coal Hoppers and Doors.

Messrs. Broadhead Constructions, Ltd., of Stretford, have received an order from the South Metropolitan Gas Company for an installation of continuous coal hoppers and doors.

Meter Conversion at Ilkeston.

The Ilkeston Corporation Gas Committee have accepted the tender of the Rotary Meter Company, Ltd., of Manchester, for the conversion of a 30,000 c.ft. per hour rectangular station meter to the patent valveless bell type of 40,000 c.ft. per hour capacity.

Simon-Carves, Ltd., Address.

We are informed by Messrs. Simon-Carves, Ltd., that they have vacated the premises they have occupied for forty years in Mount Street, Manchester, and have completed the erection of extensive new offices and laboratories, arranged on the most modern lines, at Cheadle Heath. The transfer of the whole of the firm's technical and commercial staffs to the new buildings was completed on April 13, when the Mount Street Offices were closed. The new address is Cheadle Heath, Stockport; telephone number, Gatley 3600 (7 lines); telegraphic address, "Simcar," Manchester, as before.

Lowering Gear.

The London Electric Firm, of Brighton Road, Croydon, have forwarded to us a leaflet describing and illustrating a lowering gear they have installed for warning lights on a 140-ft. wireless mast. The illustration shows a novel application of lamp suspension equipment. The problem was to fix a lamp to a wireless mast to show a warning light to aviators to prevent collision with the structure and to lower the lantern to the ground for cleaning and maintenance purposes, missing the numerous stay wires and collars on the post and having the necessary steadying lines and guides to prevent the lamp being unduly deflected by the wind while being lowered. The firm, of course, also make suspension gear for lamps (electric and gas) with or without automatic contact, connector devices, and for central lowering or traversing, and side walk lowering for narrow or wide spans of almost any width.

Contracts Advertised To-Day.

Foundation.

The Gas-Works Committee of the Oldham Corporation invite tenders for work and material required in connection with piled foundation for retort house. [Advert. on p. 180.]

STOCK AND SHARE LIST.

[For Stock Market Report, see earlier pages.]

Issue.	Share.	When ex-Dividend.	Dividends. Prev. Hf. Yr.	Dividends. Last Hf. Yr.	NAME.	Quotations. Apl. 10.	Rise or Fall on Week.	Transactions. Lowest and Highest Prices During the Week.
£			% p.a.	% p.a.				
171,978	Stk.	Feb. 5	5	5	Aldershot 5 p.c. max. C. ...	73—78	...	...
522,992	,,	,,	4	4	Do. 4 p.c. Pref. ...	75—80	...	76½
1,551,868	,,	Apl. 9	7⅞	7⅞	Alliance & Dublin Ord. ...	97—102*	−3	...
374,000	,,	Jan. 8	4	4	Do. 4 p.c. Deb. ...	70—75	...	...
522,655	,,	Mar. 5	7	7	Barnet Ord. 7 p.c.	124—129	+4	126—126½
300,000	1	Oct. 23	1/7⅛	1/4⅛	Bombay, Ltd.	16/—18/-	...	...
174,500	10	Mar. 5	9	9	Bournemouth 5 p.c. ...	15—16	...	...
500,050	10	,,	7	7	Do. B 7 p.c. ...	12½—13	...	12⅞
439,160	10	,,	6	6	Do. Pref. 6 p.c. ...	11⅛—11⅝	...	...
50,000	Stk.	Dec. 18	3	3	Do. 3 p.c. Deb. ...	60—63	...	...
162,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	81—84	...	...
357,900	,,	Mar. 19	7½	7½	Brighton & Hove 6 p.c. Con.	112—117	...	115—116
371,880	,,	,,	6¾	6¾	Do. 5 p.c. Con.	102—105	...	...
1,287,500	,,	Feb. 19	5	5	Bristol 5 p.c. max.	94½—95½*a*	...	...
120,420	,,	Dec. 18	4	4	Do. 1st 4 p.c. Deb. ...	78—80*a*	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	78—80*a*	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	99½—100½*a*	...	...
895,000	,,	Apl. 9	7	8	British Ord.	109—114*	−2	...
100,000	,,	Dec. 18	7	7	Do. 7 p.c. Pref. ...	109—114	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	74—77	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	92—97	...	...
160,000	,,	Jan. 8	5	5	Cambridge 5 p.c. Deb. ...	95—98	...	...
100,000	10	Dec. 4	10	6	Cape Town, Ltd.	9½—10½	...	...
100,000	10	Nov. 6	4½	4½	Do. 4½ p.c. Pref. ...	6½—7½	...	...
150,000	Stk.	Dec. 18	4½	4½	Do. 4½ p.c. Deb. ...	72—77	...	...
626,860	,,	Feb. 19	6	6	Cardiff Con. Ord.	96—99	...	...
237,860	,,	Jan. 8	7½	7½	Do. 7½ p.c. Red. Deb. ...	97—100	...	...
157,150	,,	Feb. 19	5	6½	Chester 5 p.c. Ord.	85—89*b*	...	...
98,936	1	Oct. 9	†2/-	†2/-	Colombo, Ltd. Ord.... ...	29/—34/-	...	...
24,500	1	,,	1/4⅛	1/4⅛	Do. 7 p.c. Pref.	18/—20/-	...	...
609,204	1	Apl. 9	1/4⅛	15'27*d*	Colonial Gas Assn. Ltd. Ord.	16/—18/-*	−/6	...
296,053	1	,,	1/7⅝	17'67*d*	Do. 8 p.c. Pref.	17/6—19/6*	−/6	...
2,073,280	Stk.	Feb. 19	6	6	Commercia Ord.	93—96	...	95½—96
475,000	,,	Dec. 18	3	3	Do. 3 p.c. Deb. ...	57—60	...	58—58⅛
787,560	,,	Feb. 19	7	7	Croydon sliding scale ...	107—110	...	108½—109½
453,100	,,	,,	5	5	Do. max. div.	82—85	...	...
542,270	,,	Mar. 5	7	10	Derby Con.	120—123*e*	...	...
55,000	,,	Dec. 18	4	4	Do. Deb.	65—70*e*	...	...
209,000	,,	Mar. 5	5	5	East Hull Ord. 5 p.c. ...	72—75	...	...
1,002,180	,,	Mar. 19	†4	†6½	European, Ltd.	93—98	...	93—100
18,953,033	,,	Feb. 19	5⅝	5⅝	Gas Light & Coke 4 p.c. Ord.	18/—19/-*f*	...	18/1½—18/6
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	63—66	...	...
4,294,691	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	78—81	+1	79½—80½
5,694,095	,,	Dec. 18	3	3	Do. 3 p.c. Con. Deb. ...	60—63	...	62—63
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	100—103	...	102—102⅜
161,480	,,	Mar. 5	10	10	Harrogate Cons. 10 p.c. max.	158—163	...	...
82,500	,,	Mar. 19	7	7	Hastings & St. L. 5 p.c. Conv.	98—103	...	100—101½
258,740	,,	,,	5½	5½	Do. 3½ p.c. Conv.	82—85	...	83—84
70,000	10	Oct. 9	§	10	Hongkong & China, Ltd. ...	13—14	...	...
213,200	Stk.	Mar. 5	6	6	Hornsey Con. 3½ p.c. ...	89—92	...	...
2,436,594	,,	Nov. 6	25	15	Imperial Continental Cap.	360—380	+5	360—372
223,130	,,	Feb. 5	3½	3½	Do. 3½ p.c. Red. Deb.	78—83	...	...
235,242	,,	Mar. 5	8½	8½	Lea Bridge 5 p.c. Ord. ...	127—130	...	...
2,145,907	,,	Feb. 19	6	6	Liverpool 5 p.c. Ord. ...	98½—99½*b*	+½	...
600,000	,,	Mar. 19	7	7	Do. 7 p.c. Red. Pref.	96½—98½*b*	...	...
165,736	,,	Feb. 19	9	9	Maidstone 5 p.c. Cap. ...	128—133	...	...
63,480	,,	Dec. 18	3	3	Do. 3 p.c. Deb. ...	54—57	...	...
75,000	5	Dec. 4	†10	†10	Malta & Mediterranean ...	6—6½	...	...
392,000	—	Apl. 2	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	86—89*	...	...
675,000	Stk.	Nov. 20	†8	†6	Montevideo, Ltd.	95—105	...	...
2,061,315	,,	Mar. 5	5	5⅓	Newcastle & Gateshead Con.	16/9—17/3*df*	...	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	74—75*d*	...	...
691,705	,,	Jan. 8	3½	3½	Do. 3½ p.c. Deb. ...	67½—68½*d*	...	...
277,285	,,	Nov. 5	5	5	Do. 5 p.c. Red. Deb.	98—100*d*	...	...
199,940	,,	Mar. 5	7½	7½	North Middlesex 6 p.c. Con.	115—120	...	...
396,160	,,	Feb. 5	5	5	Northampton 5 p.c. max. ...	74—79	...	...
300,000	,,	Nov. 20	7	9	Oriental, Ltd.	100—110	...	...
60,000	5	13 May, '15	—	—	Ottoman	0—½	...	...
205,162	Stk.	Dec. 18	8	8	Plym'th & Stonehouse 5 p.c.	110—115	...	...
424,416	,,	Feb. 19	8	8	Portsm'th Con.Stk. 4 p.c.Std.	122—127	...	124
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	78—81	...	...
686,312	,,	Jan. 22	4	4	Primitiva 4 p.c. Rd. Db. 1911	84—87	...	...
389,813	,,	Dec. 18	4	4	Do. 4 p.c. Cons. Deb.	84—87	...	...
150,000	10	Apl. 9	6	6	San Paulo 6 p.c. Pref. ...	8—8⅛*	−¼	8⅛—8⅛
1,736,968	Stk.	Mar. 19	6½	6½	Sheffield Cons.	102½—104½*e*	...	...
95,000	,,	Jan. 8	4	4	Do. 4 p.c. Deb.	78—80*e*	...	...
90,000	10	June 5	†4	†5	South African	4—6	...	5⅜
6,709,895	Stk.	Feb. 5	5	7½	South Met. Ord.	103—106	...	103½—104½
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf.	112—115	+1	113½—114
1,895,445	,,	Jan. 8	3	3	Do. 3 p.c. Deb. ...	60—63	...	61½
734,000	,,	Mar. 5	6½	6½	Do. 6½ p.c. Red. Db.	98—100	...	99⅜—99⅞
1,000,000	,,	Jan. 22	—	4	Do. 5 p.c. Red. Deb.	100—103	...	102⅜—102⅞
91,500	,,	Mar. 5	8½	8½	South Shields Con.	107—109*d*	...	...
1,543,795	,,	Feb. 19	6½	6½	South Suburban Ord. 5 p.c.	102—105	...	103½
668,837	,,	Dec. 18	5	5	Do. 5 p.c. Deb. ...	100—103	...	...
647,740	,,	Feb. 19	5	5	Southampt'n Ord. 5 p.c. max.	77—80	...	...
121,275	,,	Dec. 18	4	4	Do. 4 p.c. Deb.	75—78	...	...
179,014	,,	Mar. 5	8	8	Sutton Ord.	120—130	...	...
94,500	,,	Jan. 8	5	5	Do. 5 p.c. Deb.	96—99	...	...
250,000	,,	Mar. 5	7	7	Swansea 7 p.c. Red. Pref. ...	96—99	...	...
200,000	,,	Dec. 18	6½	6½	Do. 6½ p.c. Red. Deb.	100—103	...	...
1,076,490	,,	Mar. 5	6⅝	6⅝	Tottenham District Ord. ...	102—106	...	104—105
150,000	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	101—104	...	...
199,005	,,	Dec. 18	4	4	Do. 4 p.c. Deb. ...	77—80	...	77½
85,701	,,	Mar. 19	6	6	Tuscan, Ltd., 6 p.c. Red. Db.	74—79	...	...
310,694	,,	Mar. 5	7	7	Uxbridge, Maidenhead, & Wycombe 5 p.c.	102—107	...	...
88,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	88—93	...	...
1,322,220	,,	Mar. 5	7	7	Wandsworth, Wimbledon, and Epsom Cons. ...	110—113	...	112
426,000	,,	,,	5	5	Do. 5 p.c. Pref.	95—98	...	96½
1,013,464	,,	Dec. 18	5	5	Do. 5 p.c. Deb.	100—103	...	101½

Quotations at:—*a.*—Bristol. *b.*—Liverpool. *c.*—Nottingham. *d.*—Newcastle. *e.*—Sheffield. *f.*—The quotation is per £1 of stock. * Ex. div. † Paid free of income-tax. ‡ For year. § Div. = 10 p.ct. p.a. less tax and less tax on interim dividend.

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By Order of the Board of Directors.

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One 30 ft. × 8 ft. 3 ins. ×	160 lbs.	7054
One 30 ft. × 8 ft. 3 ins. ×	120 lbs.	6982
One F.E. 30 ft. × 8 ft. 0 ins. ×	180 lbs.	6574
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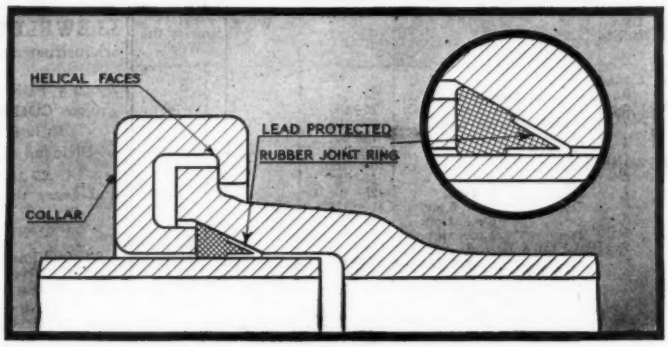

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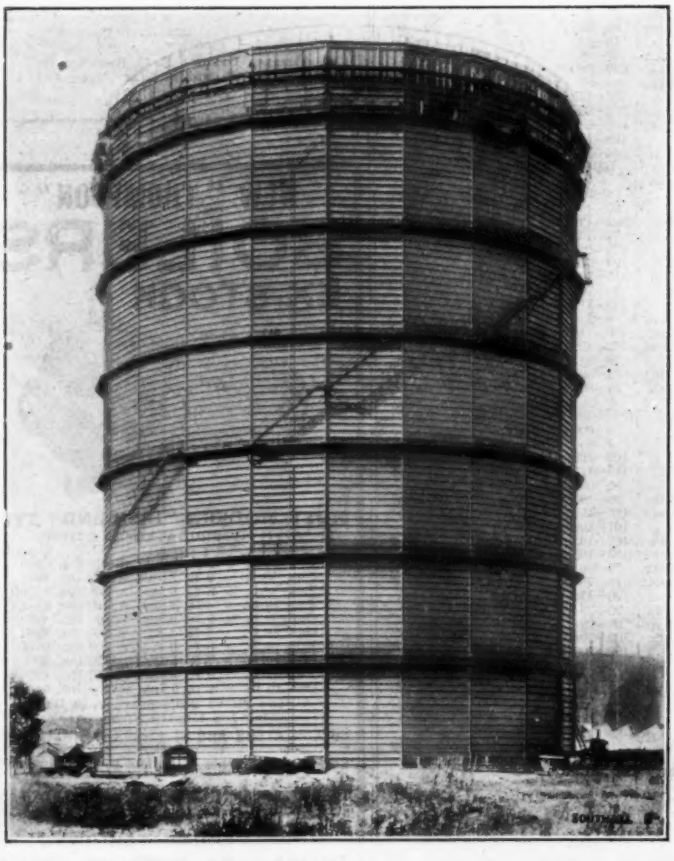

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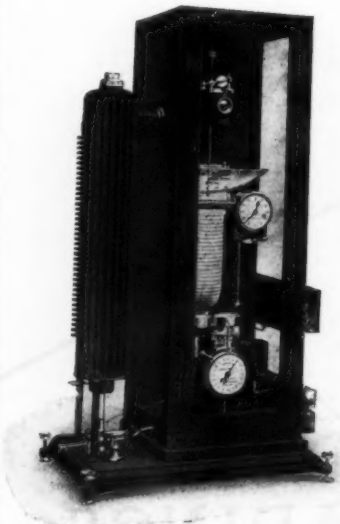

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